

What evidence is there on the effectiveness of different models of delivering urgent care?

A rapid review.

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Abstract

Background

In 2013 NHS England set out their strategy for development of an emergency and urgent care system that is more responsive to patients' needs, improves outcomes and delivers clinically excellent and safe care. Knowledge about the current evidence base on models for provision of safe and effective urgent care, and the gaps in evidence which need to be addressed can support this process.

Objective

The purpose of the evidence synthesis is to assess the nature and quality of the existing evidence base on delivery of emergency and urgent care services and identify gaps that require further primary research or evidence synthesis.

Methods

We have conducted a rapid framework-based evidence synthesis approach. Five separate reviews were conducted linked to themes in the NHS England review. A general and five theme specific database searches were conducted for the years 1995-2014. Relevant systematic reviews and additional primary research papers were included with narrative assessment of evidence quality was conducted for each review.

Results

The review was completed in six months. In total 45 systematic reviews and 102 primary research studies have been included across all 5 reviews. The key findings for each reviews were 1) Demand - there is little empirical evidence to explain increases in demand for urgent care, 2) Telephone triage - Overall, these services provide , appropriate and safe decision making with high patient satisfaction but required clinical skill mix and effectiveness in a system is unclear , 3) extended paramedic roles have been implemented in various health settings and appear to be successful at reducing transports to hospital, making safe decisions about the need for transport and delivering acceptable, cost-effective care out of hospital. 4)ED – The evidence on co-location of GP services with ED indicates there is potential to improve care. The attempt to summarise the evidence about wider ED operations proved to

be too complex and further focused reviews are needed. 5) There is no empirical evidence to support the design and development of urgent care networks.

Limitations

Although there is a large body of evidence on relevant interventions much of it is weak with only very small numbers of randomised controlled trials identified. Evidence is dominated by single site studies many of which were uncontrolled.

Conclusions

The evidence gaps of most relevance to the delivery of services are 1) more detailed understanding and mapping of the characteristics of demand to inform service planning, 2) assessment of the current state of urgent care network development and evaluation of effectiveness of different models, and 3) Expanding the current evidence base on existing interventions that are viewed as central to delivery of the NHS England plan by assessing the implications of increasing interventions at scale and measuring costs and system impact. It would be prudent to develop a national picture of existing pilot projects or interventions in development to support decisions about research commissioning.

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List of Abbreviations

A&E – Accident and Emergency
AHR – After Hours Referrals
ATS – Australian Triage Scale
CDDS – Computerised Clinical Decision Support
CGA - Complete Geriatric Assessment
CI – Confidence Interval
CP – Community Paramedic
CPOE – Computerised physician order entry
ECAP – Emergency care Access Point
ECP Emergency care practitioner
ED – Emergency Department
EMS – Emergency Medical Service
EMT – Emergency medical technicians
ENP – Emergency nurse Practitioner
EP – Emergency Physician
ES – Emergency Services
GP – General Practitioner
HS&DR – Health Services and Delivery Research programme
ICU – Intensive Care Unit
IQR – Inter Quartile Range
LOS – Length Of Stay
LTC - Long-term Care
MD – Medical Doctor
MeSH – Medical Subject Headings
NHS – National Health Service
NHSD – NHS Direct
NHSDW – NHS Direct Wales
NIHR – National Institute for Health Research
NP – Nurse Practitioner
NPPs – New Prehospital Practitioner

NPV – Negative predictive Value
NPV - Negative Predictive Value;
OOH – Out Of Hours
OR – Odds Ratio
PA – Physician Assistant
PCR-ED – Primary care Related ED
PHIL – Paediatric Health Information Line
PIA – Physician Initial Assessment
PP – Paramedic Practitioner
QALY – Quality Adjusted Life Year
RAT – rapid Assessment Team
RCT – Randomised Controlled Trial
RN – Registered Nurse
RR – Relative Risk
SC – Self Care
SDT – senior doctor triage
SHD – Swedish Health Care Direct
TLP – Triage Liaison Physician
UK – United Kingdom
USA – United States of America

Scientific Summary

Background

Demand for urgent care (including emergency care) has increased year on year over the last 40 years. The reasons for this are only partly understood but comprise a complex mix of changing demographic, health and social factors. Over the last 15 years there have been a number of reviews of urgent care, policy recommendations for service changes and service level innovations all of which were aimed at improving access to and delivery of urgent care. Despite this the emergency and urgent care system remains under greater pressure than ever. It is increasingly recognised that provision of urgent care is a complex system of interrelated services and that this whole system approach will be key to improvement and development in the future. In 2013 NHS England set out their strategy for development of a system that is more responsive to patients' needs, improves outcomes and delivers clinically excellent and safe care. Knowledge about the current evidence base on models for provision of safe and effective urgent care, and the gaps in evidence which need to be addressed can support this process.

Objectives

- 1) To examine the evidence on delivery of care relating to 5 themes:
 - Understanding demand for emergency and urgent care
 - Access and direction to the right service - Telephone triage and advice services
 - Managing urgent care outside hospital - Patient management by paramedics in the community
 - Delivery of Emergency Department services
 - Emergency and urgent care networks
- 2) What is the quality of that evidence?
- 3) What are the main/significant evidence gaps?

Methods

We have utilised a rapid framework-based evidence synthesis approach to ensure the efficient identification and synthesis of the most relevant evidence. A separate review has been conducted for each of the 5 themes. A range of search methods were used. Firstly a broad general search on Medline. This was then supplemented with targeted database searches for each of the five themes. Searches were conducted for the years 1995-2014. To increase efficiency, where appropriate we have utilised existing search strategies from related research we have conducted within ScHARR or from existing related systematic reviews. Additional references were identified by scrutinising reference lists of included systematic reviews, utilising our own extensive archive of related research and internal and external topic experts. Searches were sifted by a single reviewer and a 10% random sample checked by a second reviewer. Only empirical evidence was included. Data extraction from individual studies was only carried out for papers that met the inclusion criteria and had not been included in a systematic review. Data was extracted directly in to summary tables. We did not conduct formal quality assessment but provided a narrative summary of study quality based on the limitations reported by study authors. We have summarised the evidence for each theme and identified common issues that overlap between themes.

Results

We have conducted five separate rapid evidence reviews on themes related to the delivery of emergency and urgent care in the NHS. These themes were trends in and characteristics of demand; telephone triage and advice; management of patients in the community by ambulance clinicians; models of service delivery in the Emergency Department and Emergency and urgent care networks.

Demand for emergency and urgent care

Four systematic reviews and 39 primary studies were included. There is remarkably little empirical evidence that can fully explain the increases in demand for urgent care. The evidence key gaps and challenges identified from the existing evidence relate to a need to examine demand from a whole system perspective and gain better understanding of the

relative proportions of demand for different parts of the system and the characteristics of patients within each sector. This could be addressed by developing research studies that build on the existing knowledge about factors which may be influencing demand and the contribution each one makes, and map these in to a coherent system model. This would then support the development of service design and planning to meet current and future needs of local populations.

Telephone triage and advice

10 systematic reviews and 44 primary studies were included. There is an existing, substantial evidence base about the operational and clinical effectiveness of telephone based triage and advice services for management of requests for urgent healthcare. Overall, these services provide , appropriate and safe decision making, patient satisfaction is generally high as is the likelihood that patients will accept advice although this varies depending on the clinician providing it. There is little evidence though on efficiency of these services from a whole system perspective. . Evidence gaps and aspects of service delivery that warrant further study are centred around the need for 1) further assessment of the whole system impact of telephone access services for emergency and urgent care, including the associated costs, to establish how it contributes improving system efficiency 2) more focused research on the broad area of the optimum requirements for different skill levels needed in the NHS 111 service and 3) more detailed evaluation of the accuracy and appropriateness of call assessment decisions would help answer some of the questions about the appropriateness of referrals made by the NHS 111 service.

Management of patients with urgent care needs by the ambulance service in community settings

Seven systematic reviews and 12 primary studies were included. Extended paramedic roles have been implemented in various health systems and settings and appear to be successful at reducing transports to hospital, making safe decisions about the need for transport, delivering acceptable care out of hospital and are potentially cost-effective. The key evidence gaps and areas for further research include 1) further work on ways to support paramedic decision-making and development of integrated care pathways for a range of conditions that mediate safe management in the community setting, 2) more detailed study on the necessary skill-mix

of paramedics and paramedics with advanced and specialist skills needed to provide a safe and high quality community based service for patients, 3) more accurate estimations of the likely proportion of patients who could be safely managed outside hospital to support ambulance resource and paramedic workforce planning.

Models of service delivery in the Emergency Department

Attempting to assess the evidence on different models of delivering ED services was challenging. We conducted 2 reviews. One updated and existing systematic review on co-location of primary care and ED identified potential for this initiative. Two systematic reviews and 7 primary studies were included in this review. We have only been able to conduct a “review of reviews” (22 systematic reviews) about the wider ED service and given the complexity of the subject area we have been unable to identify clear evidence gaps. The review highlighted some areas worth further consideration, 1) additional focused reviews utilising the existing search library with, where necessary targeted focused additional searches. One of these could be management of the frail elderly in ED as this is a key area for development but there is little evidence on interventions to improve care. There is scope to identify more recent primary studies from our existing search library. 2) one clear evidence gap is the lack of studies conducted at scale. The emphasis on developing co-located primary care services within ED is one area where there is an opportunity to undertake a broader study.

Emergency and Urgent Care Networks

We found no evidence on how to best organise and operate an emergency and urgent care network or any empirical evidence on effectiveness of this type of network model. Research activities which could support emergency and urgent care network development includes 1) a more detailed and targeted rapid review to further explore the related theoretical literature and identify evidence around design and strategies for successful network development, 2) some rapid scoping research to identify and map current emergency and urgent network development nationally and 3) a programme of research to evaluate emergency and urgent care network and measure effectiveness.

Some common themes were identified across subject areas. These included 1) the relationship between better understanding of the drivers of demand and the planning of health services by networks, 2) the need to develop integrated care and referral pathways to improve effectiveness for telephone services and support patient management in the community and 3) the need to measure whole service and system impact and associated costs when evaluating interventions and initiatives.

A substantial number of included studies for most themes were from the UK but none on trends in demand.

Limitations

This was a large scope rapid review so we have not been able to conduct a detailed analysis of the quality of the evidence base. Some key themes identified include;

- Overall, the evidence base on effectiveness of different models of care for delivering emergency and urgent care is weak with small numbers randomised controlled trial designs and reliance on uncontrolled before and after studies
- An emphasis on process measurement such as times and attendance rates rather than patient outcomes other than satisfaction
- Little attention has been paid to the costs and cost effectiveness associated with interventions

A quality assessment of the 22 systematic reviews on delivery of ED care found that, overall the quality of these reviews was good with 20/22 conducting adequate searching, 13/22 assessing risk of bias, 17/22 used appropriate methods of synthesis and in 14/22 the evidence presented was judged to support author conclusions.

The limitations to the rapid review method we have used are, 1) we have not exhaustively searched for and synthesised all the relevant literature, 2) we have drawn extensively on existing systematic reviews and 3) given the potential scope and scale there are related themes that have been excluded from this review. The most obvious gaps are separate reviews of models of urgent care within primary care and specific attention to workforce issues such as skills, education and retention. We have also not been able to include PPI input to this review but this will be of benefit when prioritising which evidence gaps should be addressed to assess importance to patients.

Conclusions

We have conducted five separate rapid evidence reviews on themes related to the delivery of emergency and urgent care in the NHS. We have found there is a paucity of evidence to explain the complex reasons that have driven the increases in demand for emergency and urgent care and to support the development of emergency and urgent care networks. There exists a considerable evidence base on the effectiveness of some interventions to improve service delivery but the evidence base is overall weak and based in small single site studies with no assessment of impact at scale or on the wider emergency and urgent care system.

The evidence gaps that appear to be in most immediate need of addressing are;

- Research to characterise and map demand at a population level and link this to service need so that emergency and urgent care systems can be designed that can effectively, efficiently and safely respond to patient needs
- An assessment of the current state of play in the development of emergency and urgent care networks and longer term evaluation of the effectiveness of different network models to identify how best networks can deliver NHS England objectives
- Expanding the current evidence base on existing interventions that are viewed as central to delivery of the NHS England plan by assessing the implications of increasing interventions at scale and measuring costs and system impact.

Although not an evidence gap, a clear theme that emerged across the reviews was the need for robust, high quality and linked patient data to support these tasks.

Finally, given the large number of related programmes already at work in the NHS, it would be prudent to develop a national picture of existing pilot projects or interventions in development to support decisions about research commissioning.

Word Count - 1951

Plain English summary

The emergency and urgent care services in the NHS are under serious pressure. In response to this NHS England reviewed these services and developed a plan to transform how they work so that patients can expect to receive “*the right care, in the right place, first time*”. We have conducted a rapid review of the existing research evidence on five themes related to the NHS England review – factors affecting demand for care; telephone triage services (such as the NHS 111 telephone service); developing paramedics so they can treat more people at home; delivering care in A&E and developing urgent care networks to create joined up services. We have found that a substantial amount of research exists which could help support the development of services. However, research has not always been of high quality and so the benefits for patients is not always well demonstrated and the costs needed to provide services have often not been measured. We have identified three key areas that would benefit from further research, 1) a better understanding of the reasons for increasing demand and the services needed to provide patients with the right care at the right time, 2) better information on how best to develop urgent care networks so they plan services that meet the needs of local populations and 3) assess the implications for expanding existing services such as specialist paramedics.

Word Count - 228

Chapter 1 -Background

This rapid evidence synthesis has been written in response to a request by the NIHR HS&DR programme to examine the evidence around the delivery of urgent care services. The purpose of the evidence synthesis is to assess the nature and quality of the existing evidence base and identify gaps that require further primary research or evidence synthesis.

Demand for urgent care (including emergency care) has increased year on year over the last 40 years. This has been reflected in growth in Emergency Department (ED) attendances, calls to the 999 ambulance service and contacts with other urgent care services including primary care and telephone based services¹. The reasons for this are only partly understood but comprise a complex mix of changing demographic, health and social factors. Over the last 15 years there have been a number of reviews of urgent care, policy recommendations for service changes and service level innovations all of which were aimed at improving access to and delivery of urgent care. Figure 1 provides a summary of some of the key developments that have been widely adopted within the NHS and related policy initiatives. The timeline shows when developments were first introduced, however these have not remained static but have grown and changed over ensuing years.

Despite these initiatives the emergency and urgent care system has come under increasing strain and media attention¹, most commonly reported as failings in meeting government targets. Nationally, emergency departments have not met the target of treating and discharging or admitting 95% of attending patients within 4 hours for any year quarter from October 2012 to March 2015. <http://www.england.nhs.uk/statistics/statistical-work-areas/ae-waiting-times-and-activity/weekly-ae-sitreps-2014-15/>. Similarly there has been a reduction in the ability of ambulance services to meet the national target of responding to 75% of life-threatening calls (Red1) within 8 minutes. Performance nationally reduced from 76.2% in March 2014 to 73.4% in March 2015 <http://www.england.nhs.uk/statistics/statistical-work-areas/ambulance-quality-indicators/>, whilst at the same time the number of ambulances handover delays at emergency departments increased from 86,003 in November – March 2013/14 to 139,970 for the same period in 2014/15 <http://www.england.nhs.uk/statistics/statistical-work-areas/winter-daily-sitreps/winter-daily-sitrep-2013-14-data-2/>.

In 2012/13 the intense public scrutiny culminated in a Health Select Committee inquiry² and this scrutiny has continued. The pressure of increasing demand has more recently been exacerbated by acute shortages of associated healthcare professionals particularly in emergency medicine,³ primary care⁴ and ambulance paramedics.⁵

It is increasingly recognised that provision of urgent care is a complex system of interrelated services and that this whole system approach will be key to improvement and development in the future. In response to the clear pressure within the emergency and urgent care system, in 2012 NHS England embarked on a major review of urgent care services and in 2013 set out their strategy for development of a system that is more responsive to patients' needs, improves outcomes and delivers clinically excellent and safe care⁶. The challenge now is to find ways to put this "blueprint" in to practice.

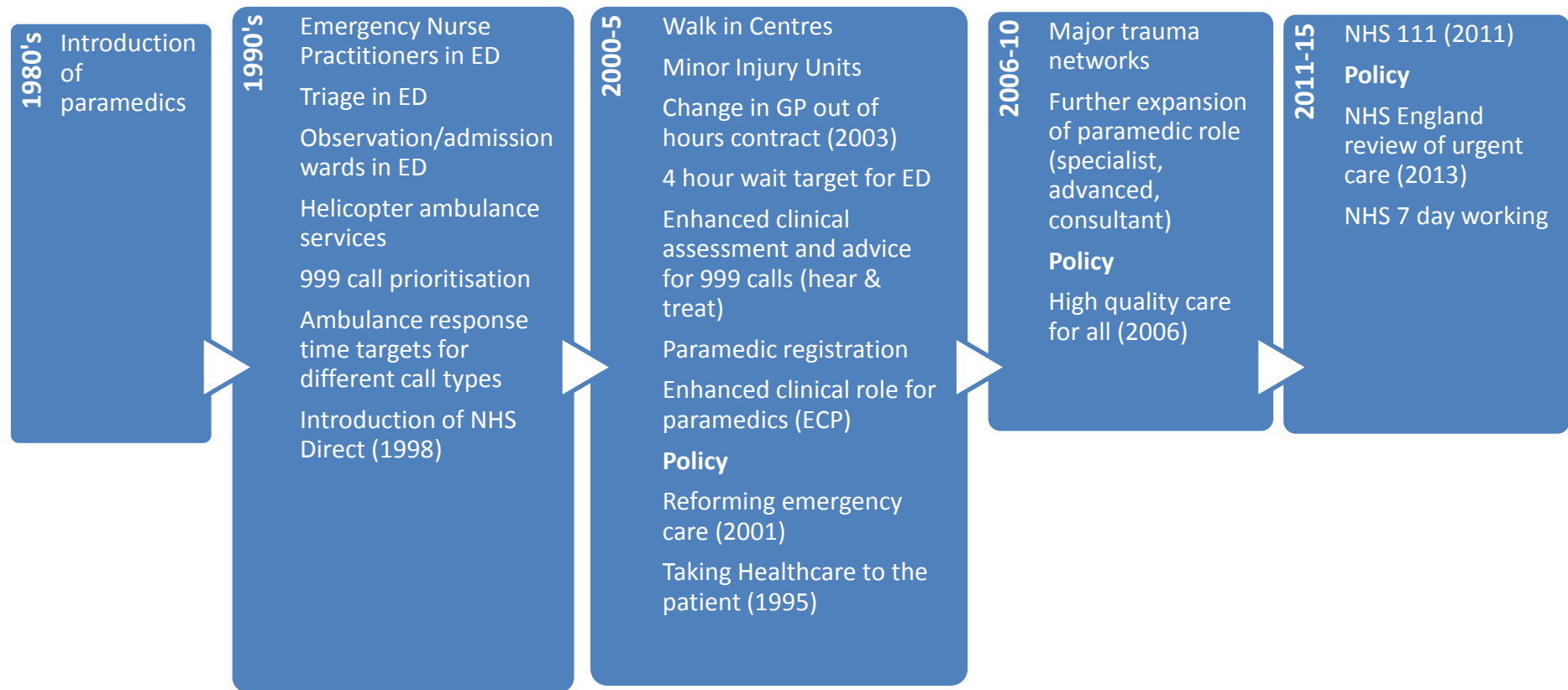


Figure 1 Selected key developments and policy initiatives for the delivery of emergency and urgent care

Knowledge about the current evidence base on models for provision of safe and effective urgent care can support this process. The purpose of this rapid review is to examine what evidence there is on how efficient, effective and safe urgent and emergency care services can be delivered within the NHS in England, the quality of that evidence and the gaps in evidence which may need to be addressed.

Hypotheses tested in the review (Research Questions)

The NHS England review⁶ has set the agenda for urgent care with recommendations on how the urgent care system and the services within it need to change. We have used the key themes identified in this review as the framework for this rapid evidence review to provide both focus and context for evidence appraisal and the identification of evidence gaps which will be of direct relevance to future developments. The five key themes identified in the NHS England review are:

- providing better support for people to self-care;
- helping people with urgent care needs to get the right advice in the right place, first time;
- providing highly responsive urgent care services outside hospital so people no longer choose to queue in A&E departments;
- ensuring that those people with more serious or life-threatening emergency care needs receive treatment in centres with the right facilities and expertise, to maximise chances of survival and a good recovery; and
- connecting all urgent and emergency care services so the overall system becomes more than the sum of its parts.

The first theme focussed on providing better support for people to self-care encompasses the much broader areas of healthcare related to reducing the need for urgent care. This theme warrants a separate review as it involves complex issues such as management of long term conditions, health promotion and injury prevention. As it targets alternative healthcare provision outside of urgent care the potential scope was considered too broad and diffuse to be included within the constraints of this review. We have therefore excluded this theme and concentrated on the other four themes directly related to delivery of urgent care.

Within each of these four key themes the NHS England review sets out more specific proposals for service change and delivery and these will form the focus of the primary scope for individual elements of the review. We have also added an additional underpinning theme not identified as a separate issue by the NHS England review. In order to develop services that are responsive to the needs of the population using them it is essential to understand the characteristics and drivers which underpin demand for services and the choices people make about how they use those services. Without this it is difficult to ensure alignment between service development and patient need. We will therefore include within our review a brief overview of a fifth theme focussed on **patterns and characteristics of the demand for urgent care (including change over time) and the factors that influence decisions about when and how to access urgent care.**

Although these key themes provide focus each one potentially still potentially includes a range of issues. To keep the review process manageable within the time and resources available we have therefore restricted the research questions for some themes to a particular service area highlighted as of particular importance in the NHS England review.

Research questions:

The research questions examine the evidence relating to the following:

- 1) To what extent does evidence on existing and proposed approaches to the delivery of urgent care support the development of four key themes in the NHS England review of urgent care?
 - helping people to get the right advice in the right place, first time – this theme could potentially cover a range of services in terms of what care is eventually accessed. However, the *process* of providing advice and directing people to the right service when they first try to access care is firmly grounded in the NHS England review as the NHS 111 telephone service. This service is seen as the gateway to directing requests for emergency care to the right service. We have therefore focussed on telephone based access services in this review.

- providing highly responsive urgent care services outside hospital – this theme also potentially includes a range of community based services. However it was beyond the scope of this review to search and synthesise all of the potential literature about community based urgent care. The 2013 NHS England review and related action plan make a clear statement that the ambulance service is considered a key provider in achieving this objective. We have therefore focussed on the evidence for developing the ambulance service to manage more people in the community setting in this review.
 - ensuring that people with serious or life-threatening emergency care needs receive treatment in appropriately staffed and resourced facilities; this theme is concerned with the provision of Emergency Department (ED) care, both major regional facilities and local ED's. There is already a substantial evidence base about the impact of providing regionalised services (e.g. for stroke, heart attack) so there is no value in repeating this here. Furthermore, service pressure is greatest in general emergency departments (and major regional facilities also function as “local” Ed's). We have therefore focussed this review on the evidence about different models and processes for delivering ED care to keep the review relevant to current NHS challenges.
 - connecting urgent and emergency care services – the NHS England review sets out a clear view that the way to achieve this objective is the development of urgent care networks to develop and manage local urgent care systems. We have focussed this element of the review specifically on evidence about models of urgent care networks.
- 2) What is the evidence on characteristics of demand for urgent care and why and how people access urgent care that may help future service planning?

We have conducted and reported a rapid review for each of these 5 themes. For each review we have considered 2 additional questions;

- 3) What is the quality of that evidence?
- 4) What are the main/significant evidence gaps?

Chapter 2 - Review methods

Overview of rapid review methods

This was a rapid framework-based evidence synthesis which needed to be completed within a relatively short timeframe of 6 months to produce a review which met HS&DR needs. We have used rapid review methods to ensure the efficient identification and synthesis of the most relevant evidence. The multiple dimensions covered by the review questions posed a considerable challenge to the rapid review process. This challenge was further complicated by the fact that emergency and urgent care does not involve discrete populations or conditions but encompasses whole populations and a heterogeneous mix of conditions and acuity and care is delivered by a range of services. As a consequence there was a potentially huge pool of related literature.

Given the large scope and time and resource constraints we have not taken a standard approach to this review. Our aim was to provide a broad overview of the existing evidence base for each theme and any associated limitations. We have therefore applied the following criteria to structure the review process.

We have concentrated on identifying and synthesising the key evidence using a focused, policy relevant framework to keep the task relevant and manageable. Framework-based synthesis has been identified as an efficient method for synthesising evidence to inform policy within relatively tight time constraints⁷.

- The review did not attempt to identify all relevant evidence or to search exhaustively for all evidence that meets the inclusion criteria. Instead we have used a structured searching approach to identify the key evidence.
- The data extraction and quality assessment have focused on the most critical information for evidence synthesis rather than aiming to exhaustively extract and critique all the available information in individual papers.
- We have not appraised the evidence in terms of how future services should be provided or make recommendations about service configuration.

Framework

As the focus of this review is on models of care, that is service and system delivery, we have not search for, or considered, evidence related to specific clinical interventions for specific conditions. We have also only included primarily evaluative research of actual interventions

(although the definition of intervention can be broad and consider changes to organisation, changing professional roles, new services etc.) in order to provide an overview of what may or may not work in practice. For this reason we have purposely excluded the more theoretical literature, for example relating to organisational behaviour, professional development and clinical competence, work psychology, patient decision making and behaviour. Where additional review in these related areas is of value these have been highlighted in the individual review chapters as specific areas for further in-depth review and analysis.

For each of the four themes related to the NHS England review we have considered three main areas;

- Evidence on efficiency and effectiveness (including cost-effectiveness) of service delivery for any identified operating models including individual service and whole system perspectives.
- Evidence on associated workforce issues where this is primary research evaluating the effectiveness of changing or developing new professional roles in the delivery of urgent care and workforce planning.
- Evidence on any related patient experience outcomes.

Urgent care provision in England is a rapidly changing environment. The NHS England review has prompted a range of work programmes⁸ and professional bodies, for example the Royal College of Emergency Medicine⁹ regularly publish recommendations about delivery of services. Where relevant we have used key policy documents published before October 2014 specifically related to the implementation of the NHS England reform of urgent care to develop the review framework.

The additional fifth theme on understanding demand and use of services has focused on primary research that;

- Reports analysis of not just amount of demand but the characteristics of that demand (for example age profiles, condition profiles, whole system demand for different types of service), and
- Reports patient derived explanatory research concerned with decisions to access urgent care.

This framework has provided a clear structure to guide the review whilst retaining flexibility that has allowed development for each individual theme in terms of defining the scope of the search strategies, defining inclusion and exclusion criteria to specify what types of studies will be included in each theme and evidence synthesis.

Search Methods

A variety of search methods were undertaken in order to identify relevant evidence for each of the review questions and themes in a timely fashion. We have used a number of different search strategies for this review but using a general structure of combining relevant terms such as:

- Population - users of the range of services within the emergency and urgent care system (ambulance services, ED, other urgent care facilities, telephone access services, primary care urgent care services).
- Outcomes - **Processes** - ED attendances, emergency admissions, ambulance calls, dispatches or transports, demand, appropriateness of level of care, adverse events.
Patient outcomes - patient experience and satisfaction, decision making, cost consequences and cost-effectiveness.

Searches were conducted in two stages;

Stage One – General search on Medline

Stage Two – Targeted database searches around telephone triage, ambulance, demand, organisation of emergency departments and networks. To increase efficiency, where appropriate we have utilised existing search strategies from related research we have conducted within ScHARR or from existing related systematic reviews.

Database search strategies:

General search

An initial broad scoping search was conducted on Medline. This broad search aimed to find studies that evaluated the impact of changes in organisation, policy, structure and systems on

urgent care. Descriptive studies without an evaluative component were not considered relevant. Key issues for consideration were access to services, appropriate management of patients, service delivery, models of delivery and clinically appropriate management of patients. The general search strategy used a combination of free text and Medical Subject Headings (MESH) and also appropriate subheadings. A detailed description of the search strategy is provided in Appendix 1. The search retrieved a large number of results and refinements were made to the search to reduce the number of results. One key modification was the removal of the term “ambulatory care” as this term retrieved a large volume of results related to outpatient rather than urgent care. The final search retrieved 9488 results. After careful discussion it was decided that due to time constraints a sample 20% would be considered for inclusion for this search and further targeted searches conducted relevant to each of the 5 themes. For the 20% sample of the general search potential inclusions relevant to the 5 themes were identified using key words and any additional references identified from this search and not identified in the targeted search were added to the list of potential inclusions for that theme.

Targeted searches

For the targeted searches the following databases were searched: Medline via OVID SP, EMBASE via OVID, Cochrane Library via Wiley Interscience, Web of Science via Web of Knowledge and CINAHL via EBSCO. Searches were limited to publication date from 1995-Current in order to keep results relevant to current services, and English Language only. All searches were completed October 2014 to January 2015. A detailed description of each of the targeted search strategies is provided in Appendix 1.

Targeted searches were conducted on the following areas, telephone triage; ambulance services; re-organisation of emergency departments; developing and building urgent care networks and demand for emergency and urgent care services.

Telephone triage

Within ScHARR extensive previous work had already been completed on telephone triage and we were able to rerun an existing search strategy for this review with expansion of the dates from 1995-Current. After deduplication there were 1127 unique references.

Ambulance services

The search on ambulance services focussed on finding literature around the impact of ambulance services treating people at home where appropriate and triaging them to more appropriate community or primary care services. Additionally, research was sought on developing the skills of ambulance personnel to enable them to perform extended roles. After deduplication there were 4499 unique references.

Organisation of emergency departments

Targeted searches were also conducted on re-organisation of emergency department. Targeted searches were conducted to find evaluative literature on service delivery following re-organisation of processes within the emergency department. After deduplication there were 3539 unique references.

A recent report by the Royal College of Emergency Medicine⁹ recommended that all emergency departments should have a co-located primary care service. We identified an existing, relevant rapid evidence review conducted by the University of Warwick¹⁰ and therefore updated the search strategy described in this review. After deduplication there were 5724 unique references for this search.

Networks

Another targeted search focused on the development and use of networks within Emergency and Urgent care. After deduplication there were 1301 unique references.

Demand for emergency and urgent care

The searches around demand for emergency and urgent care were based on searches previously completed for a project ScHARR conducted for the NHS Confederation in 2013 and were expanded to the full range of dates and databases. The search aimed to retrieve empirical research on urgent care demand, research on rising demand in the ageing population and empirical research on patient derived reasons for accessing different emergency or urgent care services. After deduplication there were 1371 unique references.

The search results were downloaded into Endnote X7.2.1.

Given the scope within each search and limited time we were not able to conduct extensive supplementary searching, for example citation searching. However, in addition to the database searches we also identified key evidence by:

- Scrutinising reference lists of included relevant systematic reviews.
- Utilising our own extensive archives of related research including a number of related evidence reviews.
- The evidence review that NHS England produced as part of their consultation.
- Consultation with internal ScHARR topic experts and some external topic experts.

Review process

Inclusion and Exclusion Criteria

We have included both quantitative and qualitative empirical evidence in the review where relevant to one of the five themes. Both UK and international evidence have been included to ensure alternative models of urgent care delivery designed to address the same objectives set out in the NHS England review (for example, reducing ED attendances) are considered. We have only included published peer reviewed evidence in order to ensure we have synthesised evidence which has already undergone methodological and expert scrutiny. Emergency and urgent care changes rapidly both in terms of demand, clinical care and service delivery so we have limited included evidence to the years 1995 – 2014 to ensure the evidence assessed has context and relevance to current policy and practice. Evidence for specific clinical interventions and conditions has been excluded as this is likely to be substantial for a large number of conditions and our focus is whole services rather than narrow condition specific populations. However we have included evidence for defined but broad (in terms of condition) populations, for example children or the frail elderly. To summarise, we have used a core set of inclusion and exclusion criteria for all 5 themes to ensure consistency in the review approach.

Inclusion criteria:

- Empirical data (all study designs)
- Emergency/urgent care
- Report relevant outcomes

- Written in English
- Published between 1995 – 2014

Exclusion criteria:

- Descriptive studies with no assessment of outcome
- Opinion pieces and editorials
- Non-English language papers
- Conference abstracts

Additional theme specific inclusion and exclusion criteria were then applied in addition to the core criteria. Theme specific criteria are described in each review chapter.

Data Extraction

Data extraction of included papers was undertaken for each theme. However, given the number of themes and scope within each one we could not complete detailed and exhaustive data extraction for all relevant inclusions. To make this task manageable, ensure consistency across the themes and enable comparisons to be made between themes we employed two strategies;

1. For each theme we used any existing, relevant systematic reviews identified from the searches as the starting point for decisions about which individual identified papers meeting the inclusion criteria we would extract data from. We did not extract data from individual papers already included in relevant systematic reviews. Instead we extracted the data from the systematic reviews in to summary tables. Any additional papers not included in the systematic reviews had data extracted in to summary tables.
2. All data extraction was carried out directly in to summary tables rather than detailed data extraction forms which would subsequently require summarising. Included research was highly heterogeneous and so we used a simple, broad template to summarise the key characteristics and findings from each included systematic review or individual paper. For each paper we summarised the study design used; population and setting; main purpose and objectives including outcomes measured and key findings and conclusions.

Quality Assessment

Rather than using a standard checklist approach we have focused on an assessment of the overall quality and relevance of the evidence included within each theme in the review. Relevance has been assessed based on factors including the number of relevant studies, particularly systematic reviews, study types and design, the country and health system the research was conducted in and whether the research is single centre or multi centre. Quality has been assessed based on study types, the strength of the evidence identified by related systematic reviews and other key factors. For each theme we have provided a narrative commentary on quality and relevance that will allow readers of the rapid evidence synthesis to make an assessment of the rigour and relevance of evidence included in the review.

We have effectively conducted five separate rapid reviews, one for each of the 5 themes set out in the research questions. We have therefore presented each review separately, describing any methods specific to that review; results; an appraisal and summary of the existing evidence and any identified evidence gaps identified which are likely to be critical to further development of the main urgent care delivery objectives related to a theme. This includes where additional, more detailed topic specific evidence review could be of value or where more primary research is needed, for example on a larger scale to provide definitive evidence of effectiveness.

The five reviews are presented in chapters 3 – 7.

A summary of all the reviews together with an appraisal of common evidence across themes to provide a more comprehensive overview that describes, compares and contrasts different approaches to the delivery of urgent care together with a headline summary of key findings is presented in chapter 8. This review has been designed to identify evidence gaps and help inform future NIHR HS&DR programme research priorities. As such the analysis has been undertaken using a research commissioning rather than service commissioning perspective.

Chapter 3 -Trends and characteristics in demand for emergency and urgent care

Introduction

The main focus of this rapid review is assessment of the evidence relevant to the NHS England review of urgent and emergency care. However, to provide context we have presented a short overview of the current state of knowledge around the characteristics and drivers which underpin demand for services. This may be of use for future planning and the ability to develop services that are responsive to the needs of the population using them and ensure alignment between service development and patient need and so is of relevance to the later review about urgent care networks.

Increases in demand for Emergency Department care are well documented. In England, demand for ED care doubled from an estimated 6.8m first attendances at type 1 (24 hour, consultant led service) EDs to 13.6m over the 40 years from 1966/67 to 2006/7 - equivalent to an increase from 138 to 267 first attendances per 1000 people per year. Since 2006/7 attendances at type 1 EDs have further increased to 14.3m in 2012/13 and at the same time there has been a rapid increase in the use of minor urgent care services (type 3 – not 24 hours, may be run by nurses or GP's, limited facilities such as X-ray) with attendances increasing by 46% from 4.7m in 2006/7 to 6.9m in 2012/13.¹¹ Similarly, demand for 999 ambulance services has also steadily increased from around 4 million calls per year in 1994/5 to 9 million in 2012/13 – an increase of 160% with utilisation rising from 78 to 171 calls per 1000 people per year over the same time period.¹ People with health problems also access urgent care via NHS 111 and primary care but NHS 111 is a relatively new service and there is a lack of national data on urgent care contacts with primary care so it is difficult to assess whole system demand for emergency and urgent care in England.

More detailed analysis of UK trends in demand is available in reports from the NHS Confederation¹ and Nuffield Trust.¹² Here we have examined the empirical evidence that may help explain why demand is changing.

Methods

The main inclusion and exclusion criteria, search strategies and review process have been described in Chapter 2. We have conducted previous reviews in this area and are aware of the relative scarcity of related evidence. In addition this topic area is not concerned with interventions or service delivery and hence processes or patient outcomes. We have therefore included literature reviews which were not systematic reviews but which have described a structured search strategy. Search dates were from 1995-2014. For this review specific additional inclusion and exclusion criteria were studies investigating;

Inclusion criteria

- Trends in demand for emergency and urgent care over time
- Analysis of characteristics of demand
- Empirical, patient based studies examining reasons why people access emergency and urgent care how they choose which service to access.

Exclusion criteria

- Studies of demand that describe volumes of activity only at single points in time

Review process

Studies were identified from updated and expanded database searching using a search strategy from one of our own previous reviews in this area¹ and a review of the evidence on callers to the 999 service with primary care problems from an NIHR Doctoral Research fellowship currently awaiting publication in the NIHR journals library (Dr M Booker, University of Bristol, personal communication). As this aim of this part of the review was to describe an overview of current evidence to provide context for the more detailed rapid reviews on service delivery we limited the studies included in three ways:

We have conducted a previous scoping review of potential reasons for increases in ambulance demand and as this is already in the public domain and available for reference we have not considered papers included in this review.¹³

1. We did not conduct a double 10% random sift of the results of the database searches. These were sifted by one reviewer (JT) and supplemented by potential inclusions identified in the 20% random sample from the general search, also sifted by the same reviewer

2. Data extraction of individual papers meeting the inclusion criteria was only conducted for papers not included in relevant review papers identified in the searches.

The results of the review sifting process are given in Figure 2.

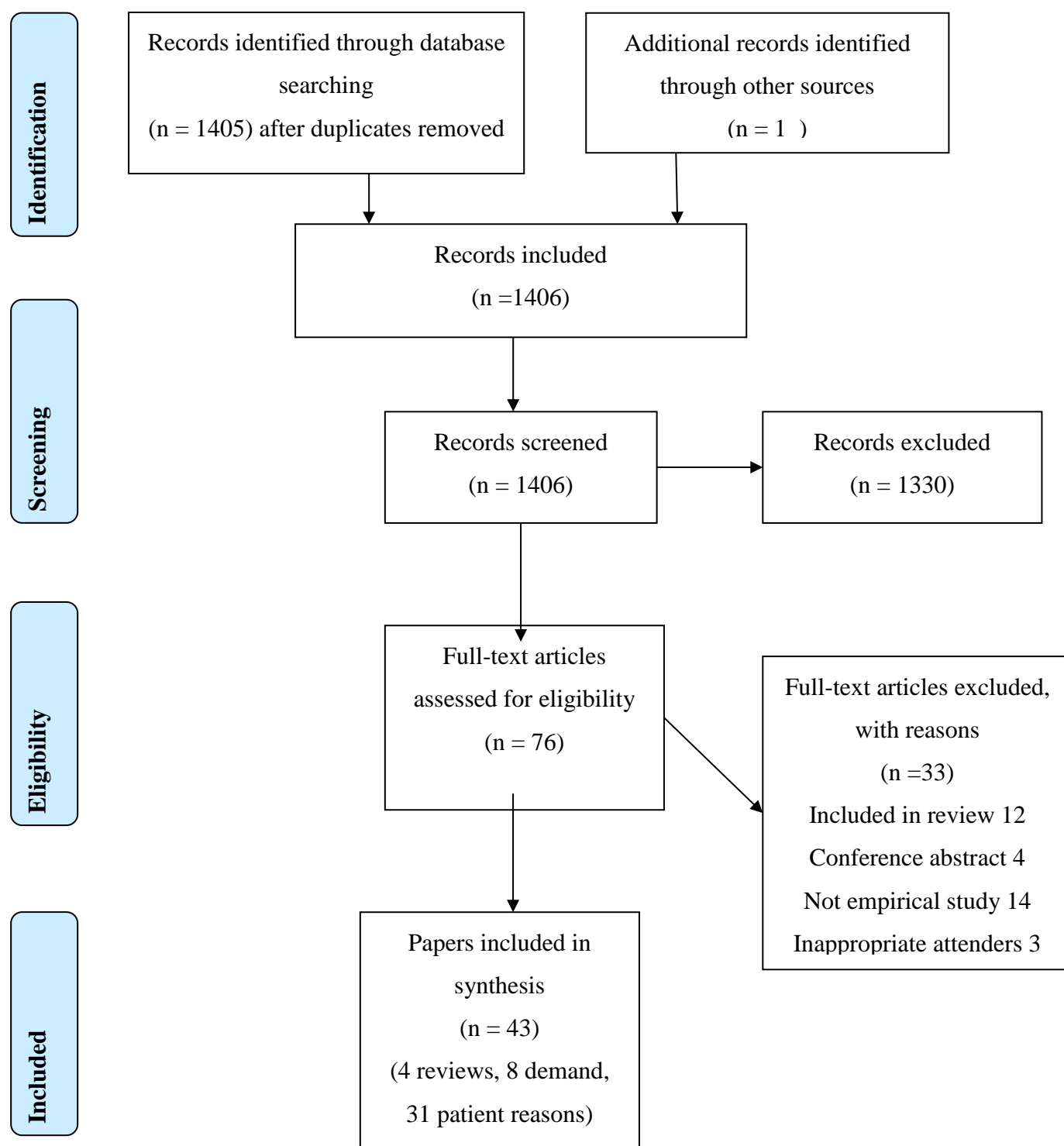


Figure 2 PRISMA flow diagram for emergency and urgent care demand searches

Results

We identified 4 relevant systematic or rapid reviews and an additional 39 primary studies not included in the systematic reviews 8 relating to demand and 31 patient based studies exploring reasons and choice in accessing urgent care. The characteristics and findings of the included reviews and primary studies are summarised in tables 1 - 3

Table 1 Summary of literature reviews related to understanding demand for emergency and urgent care services

Author; Year	Study design	Population & Setting	Purpose	Main findings
Lowthian, 2011 ¹⁴	Systematic review of published and unpublished reports generated between January 1995 and January 2010	Attendances at ED in developed countries	To synthesise the evidence describing trends and drivers associated with increased ED attendances.	56 peer reviewed papers and additional (numbers not reported) related articles and reports included. Findings on trends and drivers were categorised under primary headings of ageing – which partly but not wholly explains growth in demand; loneliness & lack of social support; mainstreaming of psychiatric care and frequent attenders; organisation of services, access to primary care and co-payments; health promotion and health awareness; convenience and appropriateness of use and risk aversion. Concluded factors associated with rising demand for ED services dependant on complex inter-related factors including demographics, socioeconomic factors and community expectations.
He, 2011 ¹⁵	Review article utilising multiple database searches and journal searching (Australia based titles). Articles published 1990 -	Attendances at ED. Paediatric attendances excluded	To identify factors affecting demand for emergency department care and describe the interrelationships between these factors.	100 papers and reports included. Utilised a conceptual framework to map the relationships between factors. Categorised factors as those describing patient health needs (chronic disease, acute illness, injury, drug/alcohol dependence); those predisposing patients to seeking help (perceptions of severity, ability to self manage, convenience, expected quality, population growth and ageing, seasonal influences); and policy factors (health insurance/payment, hospital number and size, availability of other services, geography – urban/rural). Review identified and mapped

Author; Year	Study design	Population & Setting	Purpose	Main findings
	2011			multiple inter-related factors affecting demand but no evidence on relative contribution of each factor.
Lowthian, 2011 ¹⁶	Review article utilising Ovid Medline and PubMed database searches supplemented by web-based google and google scholar searches and article reference list searches. 1996- 2009.	Emergency Ambulance calls in developed countries	To review the literature on trends in utilisation of emergency ambulances and identify the major potential drivers perceived to be contributing to increases in utilisation.	45 papers and reports included. Descriptions of growth in UK, USA, Canada, New Zealand and Australia that were in excess of population growth. Some association with ageing with reported higher utilisation in >65yrs and incrementally increasing with age and likely to be associated with increasing chronic illness and declining cognitive function. One Australian study showed age related factor only accounted for 25% of increased demand. Other potential factors include decreased social support and increasing numbers living alone; insurance coverage; accessibility of primary care and increased patient expectations and health awareness. Most ambulance based literature described ambulance activity and volumes with little examination of possible associations between rise in utilisation and patient, community or health system factors.
Gruneir, 2011 ¹⁷	Systematic review and narrative synthesis of published articles up to 2008 (start	Older adults using ED. “Older” not defined.	Review of literature on trends, appropriateness and consequences of ED use by older adults. Looked at nursing	55 articles included. Consistent findings on greater and disproportionate use of ED by older people regardless of country or healthcare system. Attendances spike at >75yrs & >85yrs Reason for visits predominantly medical and injury from falls. Also associations with self-care problems, decreased functioning and lack of

Author; Year	Study design	Population & Setting	Purpose	Main findings
	date not specified) Identified from electronic databases and searching reference lists.		home residents as sub- population	social support. Older adults have higher acuity of illness than younger ones, spend longer in ED and have more diagnostic tests and more admissions. These increase with age suggesting visits are appropriate. Needs are complex, lack of research on individual level risk factors, lack of population based studies to support this research.

Table 2 Summary of primary studies related to understanding trends and characteristics in demand for emergency and urgent care services

Author, Year, Country	Study design	Population & setting	Purpose	Main Findings
Chu, 2009 ¹⁸ Australia	Retrospective ecological study of ED attendances 2002-2006 compared for 2 groups – 14-65 years of age and >65 years	All attenders at a major adult inner city ED	To describe trends in ED use. Number of attendances Number in each category of the Australian Triage Scale (ATS) Number of admissions Total ED time Access block (proportion of patients requiring admission with total ED time \geq 8 hours)	ED attendances increased by 7.7% over the 5 years. >65yrs fell 3.3%, <65yrs increased 9%. In both group ATS 5 (least serious) fell (-48.9% >65yrs, -35.8% <65yrs), ATS 1&2 decreased >65 yrs (-15.3%) but increased in <65 yrs (16.1%), and ATS 3&4 increased in both groups. % admitted fell in both groups but higher rate in >65yrs. Median ED time higher in >65yrs group for admitted and discharged patients and increased overall for all patients. Access block increased from 7.7 to 33.3% over the 5 years. Fall in attendances by >65yrs group unexpected. May be explained by population profile and change to aged care service. Increased demand by older people may not be uniform and local trends & population mix need to be considered for planning.
FitzGerald, 2011 ¹⁹ Australia	Time trend analysis of ED presentations and population utilisation rates	Attendances at all public hospital EDs in all 8 states & territories	To describe trends in ED use and population utilisation rates nationally and for individual states. Measured ED attendances	Total growth in ED demand was 37% over the 10 years with average growth 3.6% pa. Growth varied by state (range 14%-73%). Some of this may be due to reporting changes. Trends varied with a linear pattern in 5 areas, non-linear in 2 and no change in 1. ED utilisation rates also varied between areas from

Author, Year, Country	Study design	Population & setting	Purpose	Main Findings
	over the 10 year period 2000/1-2009/10.	in Australia	ED utilisation rate per 1000 population	38% lower in 2001 than 2010 in 1 area to unchanged in 3 areas. Fluctuations in presentations during the 10 years. Changes in ED presentations may be due to population growth, but utilisation growth was greater than population growth. May be urban v rural differences which cannot be detected from current data. Aging population may have an effect but this pattern was not consistent between areas.
Leonard, 2014 ²⁰ Australia	Retrospective analysis of routine data	All ED presentations in Greater Sydney Jan 2001-Dec 2011.	To describe trends in population based rates of ED presentation in the elderly. Measured age specific rates for groups <65yrs; 65-79yrs; ≥80yrs.	11million presentation included. 1.8% annual increase per 1000 population. Compared to <65yrs adjusted incidence ratio 1.6 times higher for 65-79yrs (95% CI 1.4, 1.8 p<0.001) and 3.6 times higher ≥80yrs (95% CI 2.8, 4.7, p<0.001). For patients ≥80yrs 40 patients per 1000 population more admissions compared to <65yrs (β=40, 95% CI 29, 52 p<0.001). Rate of increase in ED presentations in group ≥80yrs is disproportionate to population changes and higher admission rates.
Lowthian, 2012 ²¹ Australia	Retrospective analysis of routine public hospital data	All ED presentations in Metropolitan	To measure 10 year trends in volume & age specific rates of ED presentations, population utilisation and	Average annual 36% rise in rate of presentation after adjusting for population changes (95% CI 3.5%, 3.8%). Almost 40% patients in ED for ≥4hrs in 2008/9 increasing for the acutely unwell. Patients ≥85yrs 3.9 times more likely to present than 35-59yrs (95% CI 3.8,

Author, Year, Country	Study design	Population & setting	Purpose	Main Findings
		Melbourne 1999/2000 – 2008/9.	ED length of stay (LOS).	4.0) and volume of older people doubled over decade, more likely to arrive by ambulance more acutely unwell, 75% have ED stay ≥ 4 hrs and 61% require admission vs 35-59yrs group. Presentation rates beyond that expected from demographic changes. Current models of emergency and community care do not meet needs for acute illness. 4 hour targets probably unachievable without whole system redesign.
Lowthian, 2011 ²² Australia	Retrospective population based analysis of routine ambulance data	All ambulance transports in Victoria 1994/5 – 2008.	To measure growth in ambulance use and the impact of population growth and ageing. Measured ambulance transportations and population utilisation rates for different age groups. Modelled future demand	Crude annual transports increased from 32 to 58 per 1000 people and by 75% (95% CI 62%, 89%) over the 14 years. Represents average annual growth rate of 4.8% (95% CI, 4.3%, 5.3%) beyond that explained by demographic changes. Patients ≥ 85 yrs transported 8 times more frequently than 45-69yrs. Forecast models suggest number of transports will increase by 46-69% from 2007/7 to 2014/15. Emergency ambulance use has risen dramatically beyond that expected by demographic changes. Increases were across all age groups but more for older patients and likely to continue to increase.
Pines, 2013 ²³ USA	Retrospective analysis of National	Patients 65 or older attending ED	To describe trends in use of ED by older adults, reasons for visits, resource use and	Over 8 year period ED visits increased from 15.9 to 19.8million (24% increase). Reasons for visits unchanged (main reasons chest pain, dyspnoea & abdominal pain). Resource use of investigations

Author, Year, Country	Study design	Population & setting	Purpose care quality	Main Findings
	Hospital Ambulatory Medical Care Survey	and recorded in survey 2001-2009		increased dramatically. Proportion seen in ED, discharged and later admitted increased from 2% to 4.2%. If no changes to primary care acute hospital facilities will need to plan for greater demand.
Margolis, 2002 ²⁴ United Arab Emirates	Retrospective cross sectional survey of attendances abstracted from ED registers	Patients aged 65 years or more who visited ED in one hospital 1989 - 1999	To describe change in ED use by the elderly in a major hospital ED.	Visits rose from 321-1347 over 10 years, mean age 72.9 years did not change but elderly attendances increased (3% to 5% $p<0,001$). Mean number of visits per person per year rose from 1.8 to 3.3 ($p<0,001$). Acuity did not change, non-urgent attendances increased from 14% to 39% ($p<0,001$) with corresponding increase of dispositions to primary care.
Moll van Charante, 2007 ²⁵ Netherlands	Prospective cross sectional population study at two 4 month periods in 1997/8 & 2002/3	All patient contacts with one GP co-operative and 3 EDs for a population of 62,000	To assess out of hours (OOH) demand for GP and emergency care and referral patterns to ED by GP co-operatives and ambulance services.	GPs managed 88% of OOH contacts & ED 12% (275/1000 inhabitants v 38/1000 per year). 43% of ED attendances were self-referrals comprising 5% of all OOH contacts. ED self-referrals predominantly young men with injury. Patients taken to ED by ambulance or referred by GP were older and more likely to be admitted to hospital ($p>0.01$). Most OOH urgent care needs managed by GPs. GPs and ambulance services appropriately select patients who need ED care.

Table 3 Summary of patient based studies on reasons for accessing urgent care

Author, Year, Country	Study Design	Population/setting	Purpose	Main Findings
Shaw, 2013 ²⁶ USA	Qualitative research through study using semi-structured interviews conducted at discharge.	Locally residing patients attending ED who were subsequently triaged to a “non- urgent area” for treatment. (n=30)	To explore patients reasons for visit to ED, knowledge of other non-urgent options, patient satisfaction.	7/30 patients had no knowledge of alternative primary care options. 23/ 30 patients attended for the following 6 reasons; 1.Instructed by a medical professional, 2.Facing access barriers to their regular source of care, 3.Perceiving racial issues with a primary care option, 4.Defining their health care need as an emergency that required ED services, 5.Facing transportation barriers to other primary care options, 6.Factoring in costs to use other primary care options vs. the ED.
Toloo, 2013 ²⁷ Australia	Quantitative, cross sectional survey by questionnaire whilst patients were waiting for or under treatment.	Patients presenting at ED via ambulance or self- transport. (n=911, (223 by ambulance, 619 by own/public transport,	To describe patient views of perceived illness severity, attitudes toward ambulance, and reasons for using ambulance	Likelihood of using an ambulance increased by 26% for every unit increase in perceived seriousness. Patients who had not used an ambulance in the 6 months prior to the survey were 66% less likely to arrive by ambulance. Patients who had presented via ambulance stated they considered the urgency (87%) or severity (84%) of their

Author, Year, Country	Study Design	Population/setting	Purpose	Main Findings
		69 by police/other/not answered).		conditions as reasons for calling the ambulance. Other reasons included requiring special care (76%), getting higher priority at the ED (34%), not having a car (34%), and financial concerns (17%).
Amiel, 2014 ²⁸ UK	Survey using self-completed patient questionnaires	Patients presenting to open access urgent care centre attached to ED providing urgent care normal GP services without appointment	To explore why patients with minor illness choose to attend an urban urgent care centre for their healthcare needs.	649 participants. Median age 29 years. 72% were registered with a GP; more women (59%) attended than men. The majority of participants rated themselves as healthy (81%). Access to care (58%) and expectation of receiving prescription medication (69%) were main reasons for attending ED. GP dissatisfaction influenced 10% of participants decision to attend an urgent care centre. 68% did not contact their GP in the previous 24 h before attending. Young adults mostly registered with a GP used urgent care centres because of convenience and ease of access rather than satisfaction levels with their GP.
Benger, 2008 ²⁹ UK	Qualitative, semi structured questionnaire	Adult patients admitted to inner city hospital after either	To determine the route by which patients with acute illness are	Direct attendance at the ED was more common when help was sought by bystanders or persons known only slightly to the patient. Most patients who attended the ED directly

Author, Year, Country	Study Design	Population/setting	Purpose	Main Findings
		ED, or GP attendance. (n=200)	admitted to hospital, the reasons and outcomes for the actions taken and the extent to which these may contribute to increased ED attendances and hospital admissions.	did so as a result of the perceived severity or urgency of their condition and there was incomplete awareness of the out-of-hours GP service. The majority of older patients who are admitted to hospital with an acute illness seek professional help from primary care in the first instance, whereas younger people contacted out of hours or other services. Out of hours patients tended to attend ED more often than primary care patients.
Lobachova, 2013 ³⁰ USA	Quantitative. Cross sectional survey via questionnaire of patients and simultaneous web based survey of PCPs.	Patients presenting to all areas of ED (n=1062). Survey of Primary Care Physicians (PCP) who were also responsible for care of patients who presented at ED (n=275)	To measure the distribution and frequency of the stated reasons why patients choose the ED for care and why primary care physicians (PCPs) think their patients utilize the ED.	The most common reason patients came to the ED was belief that their problem was serious (61%), followed by being referred (35%). In addition, 48% came at the advice of a provider, family member, or friend. By self-report, 354 (33%) patients attempted to reach their PCPs and 306 (86%) of them were successful. PCP survey showed that PCPS believed the most common reasons patients attended ED was that the patient chose to go on their own (80%) and patients felt that they were too sick to be seen in the PCP's office (80%).

Author, Year, Country	Study Design	Population/setting	Purpose	Main Findings
Norredam, 2007 ³¹ Denmark	Quantitative, questionnaire survey of walk-in patients and care providers at four Copenhagen ERs.	General Emergency Department (n=4); Migrant and national citizen usage of ED. (n=3426). response rate 54%.	To investigate the extent to which immigrants and patients of Danish origin have different motivations for seeking emergency room (ER) treatment, and differences in the relevance of their claims.	Groups of foreign origin are more likely to consider contacting primary care providers before attending ED. A higher number of immigrants were unable to access primary care and immigrant ED attendance was often due to not being able to access primary care. In contrast, more national patients claimed that the ED was more relevant for their needs. Patients from non-western or middle eastern origin were significantly more likely to attend ED because they did not live locally and could not access their normal primary care giver. Care providers reported that 21% of all ED attendances were not relevant to ED and a significantly higher proportion of non-western or middle eastern patients had irrelevant ED visits and irrelevant ED attendance was significantly related to not being able to access primary care.
Coleman, 2001 ³² UK	Questionnaire and review of notes.	Adults presenting to ED triaged to the two lowest priority	To estimate the potential of general practice, minor injury units, walk	Using objective criteria, 55% of patients with non-urgent health problems who attend ED should be treated in either general practice, or a minor injury unit, or a walk in centre

Author, Year, Country	Study Design	Population/setting	Purpose	Main Findings
		streams. (n=267)	in centres and NHS Direct to reduce non-urgent demands on accident and emergency (A&E) departments taking into account the patient's reasons for attending A&E.	or by self care after advice from NHS Direct. Nearly 25% of non-urgent patients who self-referred had previously accessed other health services for the same problem. Most patients attended as they believed they required a radiograph. There are disparities between the professional view and the patient's perceptions of the seriousness of the health problem, and expectations of care.
Marco, 2010 ³³ USA	Prospective study. Structured interview questions.	Adult patients attending ED in an urban university hospital. (n=292)	To identify factors that influence patients' decisions to seek care in ED and assesses their access to primary care.	Most participants had a primary care physician (PCP; 73%; N=4214), and a minority had called their PCP about their current problem Most participants came to the ED because of convenience/location or preference for this institution. Participants came to the ED, rather than their regular doctor, because they had no PCP, an emergency condition or communication challenges. Convenience, location, institutional preference and access to other physicians were the most common factors influencing patients' decisions to attend ED.

Author, Year, Country	Study Design	Population/setting	Purpose	Main Findings
Shipman, 1997 ³⁴ UK	Quantitative data collection on demographics and nature of complaints. Telephone surveys with 82 people who attended ED.	Patients presenting to out of hours services in a large capital city. Data from GP (OOH) and ED. (n=2564)	To examine differential use of out of hours general practice and emergency department use and to describe difference in service users.	There are differences in age related demand and presenting complaints for each service. Children comprise of a great proportion of all out-of-hours contact and more families with children under 10 presented to GP services. More digestive, respiratory, viral/non-specific complaints presented to GP, whereas musculo-skeletal problems accounted for the largest category of ED presenting problems. Usage relating to perceived and actual ability of services appeared interchangeable between sites. A collaborative multi-method approach is required to respond to and influence demand.
Beker, 2012 ³⁵ South Africa	Qualitative questionnaire conducted by ED staff.	Patients presenting to ED who were subsequently triaged as “green” by the South African Triage Score. (n=277)	To determine the patient-specific reasons for accessing the hospital Emergency Department with primary health care problems.	Of the cases 88.2% were self-referred and 30.2% had complaints persisting for more than a month. Only 4.7% of self-referred green cases were appropriate for the ED. The three most common reasons for attending the ED were that the clinic medicine was not helping (27.5%), a perception that the treatment at the hospital is superior (23.7%), and that there was no primary health service

Author, Year, Country	Study Design	Population/setting	Purpose	Main Findings
				after-hours (22%). Strict referral guidelines are needed and better methods of channeling primary health care patients to the appropriate level of care are needed.
Agarwal, 2012 ³⁶ UK	Qualitative interviews with researcher.	Purposeful sample of patients and their carers attending the ED and Urgent Care Centre at a University Hospital. (n=23)	To explore the reasons for attendance at the emergency department (ED) by patients who could have been managed in an alternative service and the rate of acute admissions to one acute hospital.	Four main themes emerged from the interviews that are pertinent to patients' decisions to attend the ED: (1) anxiety about their health and the reassurance arising from familiarity with knowledge of the emergency service; (2) issues surrounding access to general practice; (3) perceptions of the efficacy of the service; and (4) lack of alternative approaches to care. These factors are important predictors of ED attendance rates.
Foster, 2001 ³⁷ UK	Focus group methodology, with qualitative data analysis undertaken using a grounded	People aged between 65 and 81 years old from community groups based in south east London. (n=30)	To explore older people's experiences and perceptions of different models of general practice out-of-hours	Two related themes were identified. 1) attitudes to health and healthcare professionals with reference to the use of health services prior to the establishment of the NHS, a stoical attitude towards health, and not wanting to make excessive demands on health services. 2) the experience of

Author, Year, Country	Study Design	Population/setting	Purpose	Main Findings
	theory (Framework) approach.		services.	out-of- hours care and perceived barriers to its use, including the use of the telephone and travelling at night. Participants preferred contact with a familiar doctor and were distrustful of telephone advice, particularly from nurses. Older people appear reluctant to make use of out-of-hours services and are critical of the trend away from out-of- hours care being delivered by a familiar GP.
Campbell, 2006 ³⁸ Scotland UK	4 Focus groups and 51 in-depth interviews with 78 participants	Patients aged between 45 to 64 years in eight urban and rural general practices in Northeast and Southwest Scotland.	To explore whether and how patients' consulting intentions take account of their perceptions of health service provision.	Anticipated waiting times for appointments affected consulting intentions, especially when the severity of symptoms was uncertain. Strategies were used to deal with this, however: in cities, these included booking early just in case, being assertive, demanding visits, or calling out-of-hours; in rural areas, participants used relationships with primary care staff, and believed that being perceived as undemanding was advantageous. Out-of-hours, decisions to consult were influenced by opinions regarding out-of-hours services. Some preferred to attend nearby emergency departments or call 999. In rural areas,

Author, Year, Country	Study Design	Population/setting	Purpose	Main Findings
				participants tended to delay until their own doctor was available, or might contact them even when not on call.
Worth, 2006 ³⁹ Scotland UK	Qualitative, community-based study using 36 in-depth interviews and 8 focus groups with patients and or their carers and 50 telephone interviews with patient's GP and other key professionals.	Urban, semi-urban and rural communities in three areas of Scotland. Patients with advanced cancer who had recently used out of hours services.	To explore the experiences and perceptions of out-of-hours care of patients with advanced cancer, and with their informal and professional carers.	Patients and carers had difficulty deciding whether to call out-of-hours services, due to anxiety about the legitimacy of need, reluctance to bother the doctor, and perceptions of triage as blocking access to care and out-of-hours care as impersonal. Positive experiences related to effective planning, particularly transfer of information, and empathic responses from staff. Professionals expressed concern about delivering good palliative care within the constraints of a generic acute service, and problems accessing other health and social care services.
Gomide, 2012 ⁴⁰ Brazil	Qualitative interviews	New patients presenting to the ED who were 18 years or older. (n=23)	To identify reasons why users turn to emergency care services in situations that are not characterized as urgent	23 users interviewed, 13 were female and the mean age was 40 years. Reasons why patients choose emergency care: Difficulty to get immediate care at other services; limited opening hours for primary care services and most patients work during primary care opening hours; patients

Author, Year, Country	Study Design	Population/setting	Purpose	Main Findings
			or emergencies	feel that EDs have greater amount of diagnostics.
Wilkin, 2012 ⁴¹ USA	Qualitative interviews in community forum groups moderated by researcher.	Adults (≥ 18) within a defined geographical area and previous 911 users. (n=52)	What factors influence residents' decisions to use emergency versus primary care?	Participants had a wide variety of health care experiences. The findings revealed unique barriers to primary care related to both medical literacy and class disparities. Residents were not always able to evaluate which health symptoms necessitated emergency care. Barriers such as transportation, scheduling, ability to afford health care costs, and patients' attitudes toward available primary health care options might prevent people from changing their health care-seeking behaviours.
Müller, 2012 ⁴² Switzerland	Questionnaire. Self-administered, paper based questionnaire.	Walk-in patients presenting to the ED during the hours in which GPs were also open. (n=200)	To investigate why walk-in patients use a university emergency department during GP office hours.	Most walk-in patients (82%) were registered with a GP. 39% of patients visited the ED because they had reported greater confidence in the hospital emergency department. Most patients stated that they preferred the hospital to their GP in any kind of emergency and the majority defined an emergency as either a condition requiring rapid attention or a life threatening situation (53%).

Author, Year, Country	Study Design	Population/setting	Purpose	Main Findings
Palmer, 2005 ⁴³ UK	Semi-structured telephone interviews of patients to discuss recent ED contact.	Emergency Department. Patients presenting to ED triaged to 4 or 5 on the Manchester Triage Score. (n=321)	To investigate why and how patients decide to attend accident and emergency (A&E) departments, and to assess their satisfaction with the experience, in a predominantly rural west Wales population.	Of the study sample, 78% attended with injury or illnesses of recent origin, and 50% with actual or presumed musculoskeletal injury, 73% of which were sustained within 10 miles of home. Travel to hospital was by private transport for 86%, average distance 7.4 miles. Most (90%) were registered with a local GP, but 32% felt A&E was the obvious choice, and a further 44% considered their GP inaccessible to their needs. Patient satisfaction was generally high. Among the 87 patients (27%) who reported a less satisfactory experience, 48 (55%) of these complained of dismissive attitudes of doctors.
Scott, 2009 ⁴⁴ USA	Cross-sectional questionnaire survey of patients seeking care at an urgent care clinic (UCC) within a large acute care safety-net urban	Urgent Care Clinic; patients presenting to an urgent care clinic. (n=1006)	To determine the motivation behind, and characteristics of, adult patients who choose to access health care in an urgent care clinic	Fifty-four percent of patients reported choosing the UCC due to not having to make an appointment, 51% because it was convenient, 44% because of same day test results, 43% because of ability to get same-day medications and 15% because co-payment was not mandatory. 68% of patients did not have regular physician and 57% lacked a regular source of care. This study suggests that patients

Author, Year, Country	Study Design	Population/setting	Purpose	Main Findings
	hospital			choose the urgent care setting based largely on convenience and more timely care.
Schumacher, 2013 ⁴⁵ USA	Observational, cross-sectional study design	Emergency Department; Adults ≥18 years of age presenting to an ED at an academic medical centre in an urban community	To examine the relationship between health literacy, access to primary care and reasons for ED use among adults presenting for emergency care.	After adjusting for sociodemographic and health status, those with limited health literacy reported fewer doctor office visits (OR=0.6, 95% CI=0.4-1.0), greater ED use (OR=1.6, 95% CI 1.0-2.4) and had more potentially preventable hospital admissions (OR=1.7, 95% CI=1.0-2.7) than those with adequate health literacy. After further controlling for insurance and employment status, fewer doctor office visits remained significantly associated with patient health
Adamson, 2009 ⁴⁶ UK	Mixed method study (cross-sectional questionnaire survey and semi-structured interviews)	Patients selected randomly from a single GP list. (n=911 survey; n=22 interviews)	To quantify the prevalence of opinion on whether people use health services unnecessarily within primary care and accident and emergency	Survey data suggest that most people believe individuals use either GP or A&E services inappropriately (66%). Strong views relating to inappropriate healthcare use were not associated with reported seeking of immediate care. Responders tend to consider other people as time wasters, but not themselves. Individuals' generally describe clear rationales for help seeking, even for seemingly trivial

Author, Year, Country	Study Design	Population/setting	Purpose	Main Findings
			(A&E) in order to examine the impact of these views on help-seeking behaviour.	symptoms and anxiety level was strongly predictive of health-seeking behaviour. The findings suggest that people do not take the decision to consult health services lightly and rationalise why their behaviour is not time wasting.
Hodgins, 2007 ⁴⁷ Canada	Descriptive correlational study	Emergency Department; low urgency patients.(n=1612)	To what extent patients' response to less urgent health problems can be predicted using Andersen's criteria (predisposing, enabling, need determinants) and do these characteristics differ based on the place (geographic location) in which health care is sought?	Differences were observed in the percentage of participants presenting at urban and rural emergency departments by type of health problem. The two items with the highest mean scores reflected participants' perceptions of need ("severity of symptoms" and "concern problem will get worse"), while the next two items dealt with characteristics of the context within which health care was sought ("no other option" and "availability of family physician"). The next three highest rankings were, "convenience of service," "needed service only available at emergency department," and "advice from family or friends."
Penson, 2011	Patient questionnaire	Emergency	To estimate the potential	The notes review confirmed that more than two-thirds of

Author, Year, Country	Study Design	Population/setting	Purpose	Main Findings
⁴⁸ UK	and subsequent notes review.	Department; Patients 14 years and older presenting to the ED of an urban hospital. (n=285)	of alternative providers of care for minor health problems to reduce demands on emergency departments (EDs).	the presenting conditions could have been managed in settings other than ED. Attendees' reasons on the questionnaire indicated a strong belief that the only provider able to deal with their concerns at that time was the ED. For some users, ED was not the first contact with a healthcare provider for the same health problem. Few believed that they would be seen quicker in the ED or that the ED was more convenient. The most frequent reason for presenting to the ED was 'being advised to attend by someone else'. The 'adviser' was often a health professional (doctor or nurse or NHS Direct) rather than 'friends or family'.
Jacob, 2008 ⁴⁹ USA	Survey. Convenience sample of ED patients	Emergency Department paediatric and adult patients presenting to the ED> (n=311)	To define the characteristics of ED patients who used ambulance transport compared to non-ambulance users and to	Users (n = 71, 22.8%) were older than Non-users, and were more sick according to self-rated illness severity, higher nurse triage score, and higher admission rate). Patient decision regarding ambulance use was associated with both having someone who called an ambulance for them and self-estimation of illness severity (or lack

Author, Year, Country	Study Design	Population/setting	Purpose	Main Findings
			determine reasons for ambulance use.	thereof). Physicians agreed with transport method in 68% of users and 92% of non-users.
Booker, 2013 ⁵⁰ UK	Qualitative study using semi-structured interviews and thematic analysis.	Ambulance: patients and carers who had called an ambulance for a primary care-appropriate problem. Selected by research clinician in ambulance. (n=16)	To explore and understand patient and carer decision making around calling an ambulance for primary care-appropriate health problems	The primary theme was patient and carer anxiety in urgent-care decision making, and four subthemes were perceptions of ambulance- based urgent care; contrasting perceptions of community-based urgent care; influence of previous urgent care experiences in decision making; and interpersonal factors in lay assessment and management of medical risk and subsequent decision making. Many calls are based on misconceptions about the types of treatment other urgent-care avenues can provide.
Oetjen, 2010 ⁵¹ USA	Qualitative survey questionnaire.	Emergency Department. Insured patients presenting to 4 ED departments within a single state. (n=438)	To understand why insured patients use EDs rather than more appropriate medical alternatives available to reduce the strain they are placing on this	Patients can be grouped into proactive, reactive and reluctant ED users, the majority of patients being reactive. Most patients (83%) had a PCP. There was no correlation between ED use and whether patients had a PCP. 39% of patients did not contact a PCP before attending ED. A variety of factors were identified as to why patients may choose to attend ED, and choose a particular ED

Author, Year, Country	Study Design	Population/setting	Purpose	Main Findings
			critical portal of entry.	including; PCP being busy, PCP referral, OOH referral, patient perception of condition being serious, ED more convenient, friends recommendation, quality, location, staff.
Hoult, 1998 ⁵² UK	Qualitative interviews with patients.	Out of Hours. Patients calling OOH services within 2 days of a GP consultation. (n=20)	To elicit the proportion of patients who call out-of-hours within 2 days of a GP consultation, and to explore the reasons for the out-of-hours call	15% of patients who made OOH contact had had a GP appointment within the previous 2 days. 2/3 of calls were related to the initial problem, but with no evidence of patient dissatisfaction. Less than a quarter of calls were for ongoing medical conditions, and a quarter about medication prescribed at the first consultation. One third of patients had mental health problems. Many patients were high users of other services including A&E and private medicine. Some patients called with specific queries or to develop better understanding of illness.
Fieldston, 2012 ⁵³	Focus groups with 25 guardians, 42 health	Emergency Department; non-	To elicit and to describe guardians' and health	Guardians focused on perceived illness severity of their child and the needs for diagnostic and other interventions,

Author, Year, Country	Study Design	Population/setting	Purpose	Main Findings
USA	professionals participated	urgent, paediatric. Guardians of children, primary care practitioners and paediatric emergency medicine physicians.	professionals opinions on reasons for non-urgent pediatric ED visit.	alongside accessibility and availability at times of day that worked for them. Professionals focused on systems issues, concerning availability of appointments, as well as parents lack of knowledge of medical conditions and knowledge of when ED use is appropriate.
Nelson, 2011 ⁵⁴ Scotland UK	Qualitative telephone interviews using structured questionnaires.	Emergency Department; Patients attending ED with “standard, non-urgent” conditions. (n=27)	To understand patients’ perceptions of the urgency of their condition and how this influences their decision to attend EDs.	85% attended with injury and pain as main reason for attending. 37% felt they needed x-rays, 15% referred by GP, 7% advised by GP receptionist, 4% unable to obtain GP appointment. 52% attended due to healthcare professionals and friends/family advising to attend ED. 48% said condition was urgent, 52% said non-urgent. No patients rated their own condition as very urgent. 37% had made contact with a primary healthcare provider before attending. 67% said they would attend again if problem was urgent, 22% because it is open 24/7 and no appointment needed.
McGuigan,	Semi-structured	Self-referring	To discover factors	Most patients in sample thought that their conditions

Author, Year, Country	Study Design	Population/setting	Purpose	Main Findings
2010 ⁵⁵ UK	telephone interviews of a purposeful sample of patients.	patients aged over 16 who presented to ED triaged as non-urgent. (n=196)	influencing patients reason for attending the ED for non-urgent treatment.	required urgent attention. The largest proportion of presentations presented with soft tissue injuries or haematomas. Females attended because of other people's advice more than males. Family and friends rather than healthcare professionals were most common source of advice.
Redstone, 2008 ⁵⁶ USA	31 item, cross sectional, self-administered, anonymous survey.	Patients over the ages of 18, with a Primary Care Physician (PCP) presenting to the ED who were subsequently triaged as non-urgent. (n=240)	To investigate why patients with minor problems and a primary care physician (PCP) present to the ED. Results compared those attending in weekdays day-time (WDD) and those not attending during weekday-daytime (NWDD)	There were high levels of self -perceived urgency for treatment, a strong majority felt they could not wait 1-2 days for treatment. More WDD patients felt their case was too difficult for the PCP to handle as opposed to NWDD patients. Around 24% of patients in both groups felt they needed to be admitted to hospital. 70% of WDD patients were willing to contact their PCP, despite 45% feeling their condition was too complex for their PCP, 45% did not contact PCP at all. 60% of patients across both groups felt the ED was more convenient than their PCP.

Summary of findings

This review has been conducted to provide a brief overview and context for the subsequent more detailed reviews. We have therefore only identified key themes that have emerged from the available evidence.

Trends and characteristics of demand for emergency and urgent care

We identified 4 review articles and 8 primary studies that have explored trends in demand and associated characteristics. One review¹⁷ and 2 primary studies^{23,24} only considered older populations. Two studies^{16, 22} were concerned with emergency ambulance utilisation, seven focused on ED attendances and one²⁵ ED and GP out of hours. The key common themes that emerged were:

- The trend of increasing, year on year demand for emergency and urgent care is consistent across developed countries. Population utilisation rates are also increasing and this appears to be greater for ambulance services than EDs.
- Population and demographic changes explain some but not all of the increases in demand. Elderly people do utilise emergency and urgent care more frequently, particularly those aged >80yrs and are more acutely unwell but this group only accounts for about 25% of increased demand. Impact of ageing populations may also vary by locality and the relative health and socioeconomic status of the resident elderly population.
- Demand is likely to be influenced by a range of other characteristics and factors including health needs (chronic conditions, acute illness, drug and alcohol dependency); socioeconomic factors (isolation and loneliness, lack of social support, deprivation); patient factors (decision making behaviours, awareness, expectations, convenience) and policy (insurance coverage, numbers of hospitals, access to primary care, geographical differences in provision) but there has been little research examining the association between the rise in demand and these factors.
- There have been few attempts to identify and map the different influences on demand and the relative influences of each factor to create a comprehensive profile of the different health care needs of populations accessing emergency and urgent care to inform health service planning.

- There is a lack of population based studies, identification of independent risk factors associated with accessing urgent care and whole system (rather than individual service) demand studies. This is particularly constrained by a lack of information about urgent care within the primary care setting and modelling studies that can forecast likely future changes in demand.

Patient based studies examining reasons for accessing emergency and urgent care

We identified 38 relevant studies from the database searches, seven of which were included in the 4 systematic reviews and so are not included in the summary table. Of the 31 studies we have examined in more detail, 16 were qualitative interview or focus group studies, 12 were surveys and 3 used mixed designs. The majority (23/31) were conducted in the ED, predominantly with patients presenting with urgent rather than emergency conditions, 2 were with ambulance patients and 6 were in other settings such as GP surgeries and urgent care centres. A number of frequent and common themes emerged from these studies concerning reasons why patients used emergency or urgent care and their choice of where to access care.

- Access to and confidence in primary care focused highly. Factors identified included lack of awareness of options, particularly out of hours services, dissatisfaction with GPs, limited opening hours, anticipated waiting times for appointments, previous experience using OOH and perceived barriers. The elderly in particular did not like or trust telephone based out of hours services. In many studies a high proportion of patients attending ED were registered with GPs but still chose to access ED instead.
 - Perceived urgency, anxiety and the value of reassurance from emergency based services.
 - Being advised to attend ED by family, friends or healthcare professionals.
 - A belief that their condition needed the resources offered by a hospital including hospital doctors (rather than GPs), diagnostics, particularly x-rays, and treatment.
 - In some health systems, costs and transport options affected decision making.
 - Convenience in terms of location, not having to make appointment and opening hours.
- Older people were more likely to contact a GP first but younger patients contact urgent care centres, ED or out of hours as they find this more convenient.

Conclusions

Despite serious concerns about rising demand and the impact this has on health services, there is remarkably little empirical evidence that can fully explain why this has occurred. The evidence included here has highlighted a range of factors that may influence demand but much of the research has focused on either individual services or populations such as the elderly. Most of the evidence presented here has come from Australia and there were no UK studies. There is scope to replicate some of the Australian studies using UK data.

The 4 review articles helpfully brought together a broad literature of discrete studies on individual factors that may influence demand and there is a substantial patient focused literature that has examined the reasons why people choose to use emergency and urgent care and how they decide which service to access. The evidence gaps and challenges identified from the existing evidence are to:

- Examine demand from a whole system rather than single service perspective and gain better understanding of the relative proportions of demand for different parts of the system and the characteristics of patients within each sector. This more detailed understanding would allow more accurate assumptions to be made about changing care delivery, for example what is a realistic proportion of patients who could be managed out of hospital.
- Build on the existing knowledge about the range of factors which may be influencing demand and develop more sophisticated research studies that can comprehensively map these issues in to a coherent model. The conceptual model describe in the review by He¹⁵ is a useful starting point.
- Explore the relationships and associations between individual influences and demand so that the relative contribution each one makes can be assigned to a map or model. This would then support the development service design and planning to meet the needs of local populations¹⁹ and the development of predictive models that can be used to estimate likely changes in population needs for emergency and urgent healthcare²².
- All of these will require the development of robust, system wide information systems to support these complex functions.

Chapter 4 - Telephone triage and advice services

Introduction

A key principle of the NHS England urgent and emergency care review is provision of a telephone based service that can act as a gatekeeper and direct people with urgent care needs so that they can get the right advice, in the right place, at the first point of contact.⁶ NHS 111 is the cornerstone to this function and already provides a free, national, 24 hour telephone based service to triage, assess and signpost requests for urgent healthcare. However, the introduction and implementation of NHS 111 has not been without problems and the NHS England review recognises the need to substantially enhance this service in order to deliver the intended benefits within the wider urgent and emergency care system. We have reviewed the broader evidence on use of telephone based triage and advice services for access to and management of urgent care in order to summarise the current state of knowledge and identify evidence gaps which may need to be addressed to enable further development of this key service.

Methods

The main inclusion and exclusion criteria, search strategies and review process have been described in Chapter 2. Search dates were 1995-2014. For this review specific additional inclusion and exclusion criteria were;

Inclusion criteria:

- Requests for emergency/urgent care
- Telephone triage/ advice/ consultations
- Report relevant outcomes (identified below)

Relevant outcomes related to:

- Efficiency (triage accuracy; waiting times; adherence/compliance; other service impacts e.g. reduction in ED visits)

- Effectiveness (safety; unplanned health service re-contacts; patient outcomes; cost)
- Patient experience (satisfaction; acceptability; appropriateness; experience; access)

Exclusion criteria:

- Telephone services for single conditions
- Telephone services for non-urgent advice

Review process

Studies were identified from database searching and through expert knowledge of the field of interest. In addition to the studies identified through database searching the study team were aware of 10 additional studies and these were assessed for inclusion in this review. The results of the review sifting process are given in Figure 3. A randomly generated 10% sample of studies from the database searches (n=124) was double sifted by another member of the study team. The reviewers initially agreed on inclusion or exclusion for 88% of studies and agreed to exclude the remaining 10 studies after discussion. 87 papers were included in the review, representing 83 individual studies.

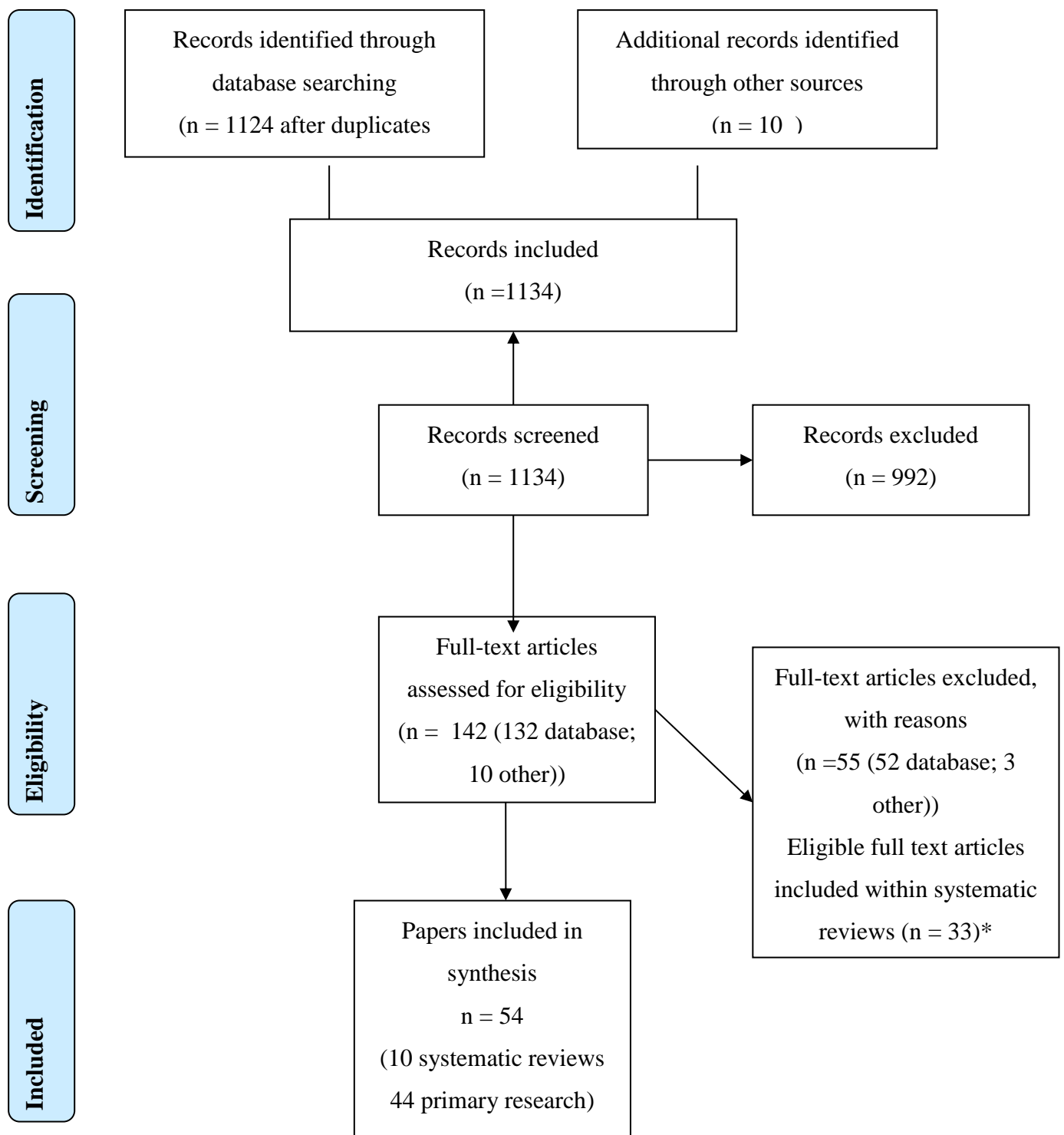


Figure 3 PRISMA flow diagram for telephone triage and advice services searches

Systematic reviews included

87 papers representing 83 studies were included in this review. 8 were systematic reviews. The results from the 8 reviews (10 papers) are shown in Table 4. Many of the references included in the reviews overlapped. This overlap is shown in Table 5. Formal data extraction was not undertaken for the 33 papers meeting the inclusion criteria and included in systematic reviews as this would have been conducted during the review process. Table 6 lists these 33 papers (32 studies) and which systematic reviews they were included in. 42 studies (43 papers) did not feature in any of the included systematic reviews and underwent full data extraction (Table 7).

Table 4 Included studies telephone triage & advice

N = 83	Studies	Papers
Systematic reviews	8	10
Included in systematic reviews	32	33
Not included in systematic reviews	42	43
Total	83	87

Table 5 Data extraction of systematic reviews of telephone triage & advice

Author; Year; Country	Study design	Population and setting	Purpose	Main findings
Blank, 2012 ^{57, 58} UK	Systematic review and narrative synthesis using rapid evidence synthesis methods.	In and OOH; Primary and Urgent; Nurse (49/52 papers)	To synthesis of evidence of the appropriateness of and compliance with different types of telephone triage advice	Triage decisions rated as appropriate varied between 44–98% and compliance ranged from 56–98%. Variation could not be explained by type of service or method of assessing appropriateness. Triage decisions to contact primary care may have lower compliance than decisions to contact emergency services or self-care.
Purc-Stephenson, 2012 ⁵⁹ Canada	Meta-analytic Review. Compares Compliance rates by type of advice (attend ED; office care (GP); self-care	In and OOH; Primary and Urgent; Nurse	To investigate if patients comply with triage advice from tele-nurses and to identify factors that may influence compliance	13 studies were included. The overall compliance rate was 62%. Compliance by type of advice was: use emergency services (ES) 63.08%; office care/GP (OC) 44.14%; self-care (SC)78.92% ES vs OC OR: 2.68, 95% CI 1.77 – 4.04; SC vs OC OR 3.30 (95% CI 2.18 – 4.99). Main reasons for non-compliance were recall problems, symptom change and accessibility to services. Non-compliant patients used lower intensity of care than advised.
Bunn, 2005	Systematic	In and OOH;	To assess the effects of	9 studies included. Not all studies reported on each outcome.

Author; Year; Country	Study design	Population and setting	Purpose	Main findings
^{60,61} UK	Review Compares staff types and different services	Primary and Urgent; GP/Nurse	telephone consultation on safety, service usage and patient satisfaction	3/5 studies reported decrease in GP visits but 2/5 studies reported an increase in follow up/ return face to face GP appointments There was no increase in ED visits (6/7 studies), except for one study about a nurse led telephone line.
Leibowitz, 2003 ⁶² UK	Systematic review Compares different services and service provisions	OOH primary and urgent; Nurses and Physicians	To determine what evidence exists about the effect of different models of out-of-hours primary medical care service on outcome.	Results indicate the introduction of a telephone triage and advice service for after-hours primary medical care may reduce immediate medical workload. Studies consistently showed patient dissatisfaction with telephone consultations. There was very little evidence about the advantages of one service model compared with another in relation to clinical outcome.
Huibers, 2011 ⁶³ The Netherlands	Systematic review of levels of urgency described in real and simulated patient studies	OOH primary and urgent. Patients first request for help	To assess the research evidence on safety of telephone triage in out- of-hours primary care.	13 observational studies showed that on average triage was safe in 97% (95% CI 96.5 – 97.4%) of all patients contacting out-of-hours care and in 89% (95% CI 86.7 – 90.2%) of patients with high urgency. 10 studies that used high-risk simulated patients showed that on average 46% (95% CI 42.7 – 49.8%) were safe.

Author; Year; Country	Study design	Population and setting	Purpose	Main findings
Chapman, 2004 ⁶⁴ UK	Systematic review Compares across services and GP vs Nurse	In and OOH Primary and urgent care; Nurse/GP	To review the evidence of 7 recent innovations in service provision to improve access or equity in access to primary care	GP led telephone services (5 studies) Decrease in demand for same day appointments but may increase subsequent contacts; Patients view service as appropriate Nurse led telephone services (4 studies) Nurses manage most OOH calls safely and effectively, with no increase in GP contact within 3 days; No difference between GP/ nurse triage for 7 day mortality, hospital admissions, or A&E attendances. NHS Direct (1 study) Easily accessible, well used and high quality; high caller satisfaction rates; no less safe than other service; concern over delays in getting through/quality of self-care advice. Telephone consultations (GP or nurse) can safely substitute face-to-face consultations, but it is not clear if this reduces face-to-face consultations over time.
Stacey, 2003 ⁶⁵	Systematic review	In and OOH primary and	To evaluate the effects of teletriage services on	10 comparative studies met the inclusion criteria. Various delivery models were compared. Despite differences in

Author; Year; Country	Study design	Population and setting	Purpose	Main findings
Canada	Compares across services and Dr vs Nurse	urgent care; Nurse and Doctor led services	health service use, caller safety, satisfaction and health-related quality of life	interventions, the studies indicated that teletriage decreased immediate GP visits without increasing adverse outcomes (subsequent hospitalizations, ED visits or deaths). Half of the calls were fully managed by the teletriage service. Caller satisfaction ranged from 55%-90% for RN call centre programs and was 70% for MD teletriage. The effect of teletriage on immediate ED visits, subsequent contact with practitioners and health-related quality of life was less clear.
Carrasquero, 2011 ⁶⁶ Portugal	Systematic review	In and OOH, primary and urgent care	To review telephone triage and advice service evaluation studies and compare results	55 papers included. Key findings for each outcome: Studies were unable to demonstrate high rates of advice appropriateness; Patient compliance varied by type of advice and is higher when measured by self-report data; Access to care is not always improved; Medical workload is usually reduced (but may be only delayed.); Few reported adverse events with death; No studies on long-term clinical outcomes; Most report high patient satisfaction; Most suggest there is a net cost benefit but some disagree; No study evaluated all relevant benefits and costs or perspectives.

Table 6 Group of studies included in multiple systematic reviews *

Author; Year Primary study ID	Blank 58,57	Purc- Stephenson 59	Leibowitz 62	Bunn 61,60	Huibers 63	Chapman 64	Stacey 65
Munro; 2000 ⁶⁷						✓	
Moore; 2002 ⁶⁸	✓	✓					
Lattimer; 1998 ⁶⁹			✓	✓		✓	✓
Gallagher; 1998 ⁷⁰						✓	
Christensen; 1998 ⁷¹			✓				
Dale; 1997 ⁷²	✓	✓					
Jackson; 1997 ⁷³					✓		
Giesen; 2007 ⁷⁴	✓				✓		
Killip; 2007 ⁷⁵					✓		
Marklund; 2007 ⁷⁶	✓	✓					
Stewart; 2006 ⁷⁷	✓				✓		
Kempe; 2006 ⁷⁸	✓	✓			✓		
St George; 2005 ⁷⁹					✓		
Bogdan; 2004 ⁸⁰	✓	✓					
Richards; 2004 ⁸¹	✓						
Sprivulis; 2004 ⁸²	✓				✓		
Kempe; 2003 ⁸³	✓				✓		
Foster; 2003 ⁸⁴	✓						
Belman; 2002 ⁸⁵	✓						

Author; Year Primary study ID	Blank ^{58,57}	Purc- Stephenson ⁵⁹	Leibowitz ⁶²	Bunn ^{61,60}	Huibers ⁶³	Chapman ⁶⁴	Stacey ⁶⁵
O' Connell; 2002 ⁸⁶	✓	✓					
Jiwa; 2002 ⁸⁷				✓		✓	
Kempe; 2001 ⁸⁸	✓	✓					
Frisbee; 2001 ⁸⁹	✓	✓					
Derkx; 2008 ⁹⁰					✓		
Hirsh; 2007 ⁹¹	✓				✓		
Labarère; 2003 ⁹²	✓				✓		
Dale; 2004 ⁹³	✓				✓		
Lee; 2003 ^{94, 95}	✓	✓					✓
McKinstry; 2002 ⁹⁶				✓		✓	✓
De Coster; 2010 ⁹⁷	✓	✓					
Giesen; 2007 ⁹⁸	✓						
Thompson; 1999 ⁹⁹							✓

*Carrasquero review ⁶⁶ has been excluded from this table as no reference list of included studies is available

Table 7 Data extractions from all other studies on telephone triage and advice

The following data extractions are from studies which did not appear in any of the 8 included systematic reviews.

EMS based studies

Author; Year; Country	Study design	Population and setting	Purpose	Main findings
Dale, 2003 ¹⁰⁰ UK	Pragmatic controlled trial. Compares Nurse telephone advice versus standard response	999 callers with urgent care problems; Nurse/Para medic	To investigate the potential impact of providing telephone advice for low urgency ambulance service callers	Nurses were more likely than paramedics to triage calls as not requiring an ambulance OR 1.28 (95% CI 1.12 to 1.47). Of the 330 (52%) triaged as not requiring an emergency ambulance, 119 (37%) did not attend ED, whereas 55 (18%) of those triaged by a nurse/ paramedic as requiring an ambulance did not attend ED (odds ratio 2.62; 95% CI 1.78 to 3.85). 9% triaged as not requiring an emergency ambulance were admitted to a hospital bed.
Studnek, 2012 ¹⁰¹ USA	Two phased retrospective study with nurse telephone available in 2nd phase. Compares telephone nurse vs	Low urgency ambulance; Nurse	To determine whether secondary telephone triage by a nurse was associated with subsequent hospital admission	In phase 2 49% of eligible patients completed secondary triage by an advice line. Of these, 71% required immediate care and delayed care was appropriate for 29%. Those classified as requiring immediate care were more likely to be admitted to hospital than those classified as appropriate for delayed care (29% vs 16% p<0.01). One patient classified for delayed care required an ICU admission. From the 1st phase

Author; Year; Country	Study design	Population and setting	Purpose	Main findings
	standard care			(no telephone nurse) 25% of patients classified as requiring delayed care were admitted to hospital. In the 2nd phase a subset of patients were identified as requiring delayed care and these had a significantly lower frequency of hospital admission.
Turner, 2006 ¹⁰² UK	RCT and postal questionnaire. Compares telephone advice versus standard care	Low urgency ambulance	To assess the costs and benefits of transferring low-priority 999 calls to NHS Direct for further assessment and advice.	The return rate back to the ambulance service was 66.9% (range 36.1–75.5%). Of returned calls 25% were returned for a 999 response and the remainder for transport or other non-clinical reasons. Callers were generally satisfied with the service
Infinger, 2013 ¹⁰³ USA	Retrospective review of routine data and follow up	Low urgency ambulance	To analyse the impact of implementing transfer to an advice line nurse for low acuity patients	329 (20%) patients were transferred to an advice-line nurse and 204 (12%) received no ambulance response. 118 of the patients who were not transported by ambulance (58%), completed telephone follow-up, 88% reported the non-transport option met their health-care needs. 92% of responders would accept the transfer again.

Author; Year; Country	Study design	Population and setting	Purpose	Main findings
Smith, 2001 ¹⁰⁴ USA	2 phased prospective study. Compares Nurse telephone versus ambulance response	In and OOH non-emergency 911; Nurse	To examine the effects of transferring non-urgent 911 calls to a telephone consulting nurse.	There were no adverse outcomes detected. Patients were satisfied with the outcome in 96% of the cases. Transferring 911 calls to a nurse line resulted in fewer BLS responses
Palma, 2014 ¹⁰⁵ Italy	Retrospective qualitative analysis of EMS telephone calls. Compares Green black calls compared to other calls	EMS; Nurse	To analyse factors associated with registered nurse under-triage of EMS calls subsequently found to be associated with deaths (green-black code cases).	Characteristics associated with green-black calls; Older patient (>80+); Callers were individuals calling on behalf of patients, rather than patients themselves; Callers reported non-life threatening symptoms; Nurse operators did not always ask about vital signs as required by the Medical Priority Dispatch System protocol; Phone conversations were shorter (54.26 seconds vs 65 seconds).

NHS 111 based studies

Author; Year; Country	Study design	Population and setting	Purpose	Main findings
Turner, 2013 ¹⁰⁶ UK	Controlled before and after study using routine data	In and OOH urgent; Non- clinical	To measure the impact of the urgent care NHS 111 on the emergency and urgent care system.	There was no change overall in emergency ambulance calls, ED attendances or urgent care use. Calls to NHS Direct reduced by 19.3% (95% CI – 24.6% to – 14%) and emergency ambulance incidents increased by 2.9 (95% CI 1.0% to 4.8%). Overall emergency and urgent care system activity increased in each site, ranging 4.7 – 12%/month and this remained when assuming that NHS 111 will eventually take all NHS Direct and GP out of hours calls.
O'Cathain, 2013 ¹⁰⁷ UK	Cross sectional population survey.	In and OOH urgent; Non- clinical	To explore users' acceptability of NHS 111.	41% of 4265 people responded. Over 90% said the advice was helpful or quite helpful. 86% complied with the advice and 95% were satisfied. Users were less satisfied with the relevance of questions asked, and the accuracy and appropriateness of advice given. Users who were auto-routed to NHS 111 from services such as GP out-of-hours services were less satisfied than direct callers.
Knowles,	Telephone survey –	In and	To identify any	59% of respondents had heard of NHS 111 and 9% reported

2014 ¹⁰⁸ UK	multiple sites	OOH urgent; Non-clinical	inequity in awareness or use of telephone-accessed health care.	ever using NHS 111. Respondents were less likely to have used NHS 111 if they were older ($p \leq 0.001$), male ($p \leq 0.001$), and did not have a disability/limiting long-term illness ($p \leq 0.001$) or own their home ($p = 0.039$).
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Cost studies

Author; Year; Country	Study design	Population and setting	Purpose	Main findings
Lambert 2013 ¹⁰⁹ UK	Cost minimisation study. Compares NHS Direct advice vs patient-stated first alternative had NHS D not been available	In and OOH emergency and urgent care; Nurse; NHSD	To determine financial and quality of life impact of patients calling the NHS Direct	An average per patient saving of £19.55 (36%) compared with patient-stated first alternatives, representing an annual cost saving of £97,756,013. Self-classified 'urgent' cases made significantly greater health gains than those who said they were 'non-urgent' (urgent by 21.5 points; non-urgent by 16.1 points).
O'Connell, 2001 ¹¹⁰ USA	Before and after cost analysis. Compares pre and	In and OOH Urgent;	To assess patient satisfaction and a health plan's return on	More than 90% of users were satisfied, and utilization of hospital ED and physician office services decreased significantly after service implementation. Reductions in

	post service introduction	Nurse	investment associated with a telephone-based triage service	health plan expenditures exceeded the costs of service provision. The plan's estimated return for every dollar invested in the nurse triage service was approx. \$1.70.
Cariello, 2003 ¹¹¹ USA	Cost evaluative. Compares cost of original intentions with actions after the call	In and OOH emergency and urgent care; Nurse;	This study evaluates service quality and cost of a nationally recognised nurse telephone help-line	Most callers rated the level of service quality very highly. The overall rating of service quality, measured by the total score on the SERVQUAL instrument was a mean of 6.42/7. The action taken by the caller after the call resulted in cost savings (38.6% reduction in cost).
Navratil-Strawn, 2014 ¹¹² USA	Economic analysis. Compares compliance vs non-compliance cost	24 hour Nurse telephone helpline	To identify whether compliance with nurse advice was associated with lower expenditure	Overall, 57% of callers were compliant with nurse recommendations. The average expenditures were \$328 lower among compliant callers.
Morimura, 2010 ¹¹³ Japan	Before and after study using routine data. Compares Ambulance use and cost before and after introduction of telephone line	Ambulance service callers; 24/7 nurse-run telephone advice line	To assess if a new telephone advice centre service reduced ambulance use in non-urgent cases and decreased ambulance costs	Compared with the previous year, the number of ambulance uses per 1 million people decreased (46846, vs 44689, $p < 0.0001$). The emergency hospitalisation rate of ambulance cases increased significantly because of the decreased proportion of non-urgent cases (36.5%, vs 37.8%, $p < 0.0001$). The total cost related to despatching ambulances was reduced by approximately £4,520,000.

All other studies

Author; Year; Country	Study design	Population and setting	Purpose	Main findings
Sakurai, 2014 ¹¹⁴ Japan	Retrospective quality assessment. Compares telephone consultation advice with medical records	24 hours Nurse telephone helpline	To investigate the 7119 process by reviewing the outcome of triage in order to identify system problems	Problems identified with the telephone triage system were - refusal of telephone triage recommendations (20% refusal from peer review of 56 cases) - problems with staff education - problems with the protocol itself
Huibers, 2013 ¹¹⁵ Netherlands	Cross-sectional study of patients using a validated questionnaire. Compares age groups/experience	OOH Nurse telephone helpline	To identify if patient/age experience of telephone consultations were associated with follow- up contact	Half of patients had a follow up contact. More probability of follow-up contacts in patients age >65 (OR 2.39), for cooperatives with high levels of telephone consultations (OR, 1.02). Decreased probability for patients who had positive nurse telephone experiences (OR,0.68).
Holm Hansen, 2011 ¹¹⁶ Norway	Assessment of medical scenarios Compare with national guidelines	OOH Nurse telephone helpline	To evaluate decisions about urgency made by nurses in out-of-hours services in Norway.	Among the acute, urgent and non-urgent scenarios, 82%, 74% and 81% were correctly classified according to national guidelines.

Author; Year; Country	Study design	Population and setting	Purpose	Main findings
Cook, 2009 ¹¹⁷ UK	Expert review. Compares appropriateness of NHS 24 ED referrals reviewed by GPs and ED doctors	In and OOH emergency and urgent care; Nurse; NHS 24	To compare different specialty doctors views on the appropriate-ness of NHS 24 referrals to ED	Agreement with ED disposal was 59.2% for ED doctors and 47% for GPs. ED doctors thought 20.8% of cases should have been referred to primary care, GPs, 35.7%. Results show GPs and ED consultants believe many NHS 24 ED referrals should be handled in primary care.
Al-Abdullah, 2008 ¹¹⁸ Saudi Arabia	Prospective observational study Compares appropriateness of different provider referrals	In and OOH urgent care; ED; Nurse telephone line; GP; self-referred	To determine the appropriateness of patients referred by a telephone health service to a paediatric ED compared to self and Physician referred patients	More physician referred patients were rated appropriate than health-line (80% v56%, $p < 0.001$) or self/ parent-referred (63%, $p = 0.002$) (appropriateness assessed by the examining ED physician). Physician referred patients were significantly more likely to have investigations/ treatment, be admitted to hospital, longer lengths of stay. Using explicit criteria that gives equal weight to symptoms, diagnosis and parental concerns found no significant differences in visit appropriateness.

Author; Year; Country	Study design	Population and setting	Purpose	Main findings
Ng, 2011 ^{119, 120} Australia	Prospective observational study using chart review. Compares health direct referred versus self-referred patients and GP referred	In and OOH emergency and urgent care; Nurse; Health Direct	To assess the appropriateness of Health Direct ED referrals	No differences in appropriateness between Health Direct (72.9%) and self-referred (73.8%) patients ($p = 0.72$). GP-referred patients were significantly more appropriate (89.7%) than other groups ($p < 0.01$). Health Direct nurses used ambulance services appropriately in 97% of cases. Health Direct patients were often unwell; 25.7% required hospital admission, 37.9% required assessment by specialist inpatient teams, and 67.5% required laboratory or radiological testing in the ED.
Beaulieu, 2008 ¹²¹ USA	Before and after study using a survey. Compares data 12 months prior and after 1 year service	Primary care; Paediatric; Nurse	To examine the effect of a telephone advice nurse on parent/ caregiver satisfaction and access to care.	Post-implementation group said nurse-parent/caregiver shared decision-making was important, (100% vs 75%) ($p < 0.05$). No difference in satisfaction levels or views on the helpfulness of the nurse.
O'Cathain, 2005 ¹²² UK	Qualitative interview study	In and OOH emergency	To determine whether NHS Direct facilitates patient empowerment	NHS Direct facilitates patient empowerment by: Enabling patients to self-care and access health advice/ services; Service provides patients with time, respect, listening,

Author; Year; Country	Study design	Population and setting	Purpose	Main findings
		and urgent care; Nurse; NHSD	(helping people to be in control of their health, health interactions)	support, and information; Alternative contact point for people seeking to avoid being labelled ‘time wasters’; Legitimises help-seeking actions
Mark, 2003 ¹²³ UK	Mixed method evaluation Compares call data before and after introduction of NHSD	In and OOH emergency and urgent care; Nurse; NHSD	To study the impact of introducing a telephone health-line	Use of primary care centres declined following the arrival of NHS Direct; home visits initially increased then decreased; out-of-hours doctor advice and accident and emergency attendances showed a progressive increase; and information calls increased during the study period.
Leclerc, 2003 ¹²⁴ Canada	Secondary data analysis Compares User recollection of advice versus recorded advice	In and OOH emergency and urgent care; Nurse	To examine the telephone advice-line users’ perception of the advice to recorded advice.	Many callers appear to interpret advice to seek additional health care differently than intended. Advice to consult was recorded by the nurse in 42 percent of cases, whereas 39 percent of callers stated they had received one. Overall disagreement between the two sources is 27 percent.
O’Cathain, 2003 ¹²⁵ UK	Scenario based comparisons Compares	In and OOH emergency	To examine the consistency of triage outcomes by NHS	Overall agreement between the nurses using the four systems was “fair” rather than “moderate” or “good” ($\kappa=0.375$, 95% CI: 0.34 to 0.41). E.G, the proportion of calls triaged to

Author; Year; Country	Study design	Population and setting	Purpose	Main findings
	agreement between nurses	and urgent care; Nurse; NHSD	Direct nurses	accident and emergency departments varied from 22% (26 of 119) to 44% (53 of 119).
Kempe, 2000 ¹²⁶ USA	Prospective evaluation Compares nurse versus Doctor assessment of urgency	OOH emergency and urgent care; Nurse;	To examine the effect of second level physician triage on the rate of after- hours referrals (AHR)	From 955 eligible calls, 22% were initially given an urgent disposition by Call Centre nurses. Physician questionnaires were completed for 97%. Of patients triaged for AHR, 49% were given an AHR, 17% a next day office referral, and 34% home care and advice. Second level physician triage halved the number of after hours referrals.
Richards, 2004 ¹²⁷ UK	Cluster RCT. Compares NHS Direct versus GP practice based nurse triage for same day appointments	In hours primary and urgent care; Nurse;	To assess the effects on consultation workload and costs of off-site triage by NHS Direct for patients requesting same day appointments	NHS Direct group patients' calls were less likely to be resolved by a nurse and more likely to have a GP appointment. NHS Direct calls took longer (mean 7.62 minutes longer) and costs were £2.88 more (£0.88 to £4.87) per patient triaged (difference between groups in proportions of patients at each final point contact after triage).

Author; Year; Country	Study design	Population and setting	Purpose	Main findings
LaVela, 2010 ¹²⁸ USA	National cohort study (18 clinics)	In hours primary care; Staff type unknown	To understand patients' experiences regarding telephone encounters for medically based purposes.	Calling for an urgent medical issue was associated with dissatisfaction. Odds of call satisfaction were greater when patients thought staff was friendly (10x), call answer was timely (5x), and needed medical information was provided (7x).
Kinnersley, 2010 ¹²⁹ UK	Cross survey using the validated Out-of-Hours questionnaire. Compares across service providers	OOH; GP; A&E; NHSD	To identify strengths and weaknesses of out of hours service provision in Wales.	Across providers and types of care, consistent strengths were the 'manner of treatment by call operator' and the 'explanation of the next step by call operator'. Consistent weaknesses were the 'speed of call back by the clinician', the 'information provided by the GP',
Strom, 2009 ¹³⁰ Sweden	qualitative method with a phenomnographic approach	Nurse	To describe patients' perceptions of receiving advice via a medical care help line	Patients perceived the help line as: Professional, reliable and easily accessible; self-care promoted through personal advice and "back up"; satisfactory when the nurse is calm, friendly, confirming and shows respect; compliance and acceptance enhanced when patients feel involved in the decision-making process; perceived as simple and time saving.

Author; Year; Country	Study design	Population and setting	Purpose	Main findings
Dunt, 2006 ¹³¹ Australia	Pre and post-trial telephone surveys of two random samples. Compares Stand-alone call centre versus GP cooperative	OOH; urgent;	To study the impact of two standalone call centres and one GP cooperative in improving consumer access to services	Consumer acceptability and affordability increased in residents in the area served by the GP cooperative. Access, however measured, did not improve in either of the standalone call centre areas. Reduction in unmet need approached but did not achieve statistical significance in most but not all trial areas.
Kempe, 2000 ¹³² USA	Prospective observational study. Compares nurse referral versus physician view	OOH; Urgent; Paediatric; Nurses; Hospital	To evaluate the appropriateness of urgent after hours referrals(AHR) and parental compliance	Of the referred patients, 339 (82.9%) complied with the recommendation for AHR. 90.7% of patient referrals was judged appropriate. Of evaluated patients, 37.0% had a diagnostic test, and in 43.5% of cases, the evaluating physician thought a therapeutic intervention was necessary that night. 6.6% were admitted to the hospital.
Crane, 2000 ¹³³ USA	Prospective observational study comparing recorded advice v parental actions	OOH primary and urgent care; Paediatric residents	To determine parents' compliance to after- hours telephone advice given by paediatric residents	83.6% of 493 caregivers followed the telephone advice. Of the 270 callers only given telephone advice, 90.4% followed the advice, 15 (5.6%) went to the ED, and 11 (4.1%) made an appointment for the next day. When a visit to the ED was recommended, 93.5% complied.

Author; Year; Country	Study design	Population and setting	Purpose	Main findings
Monaghan, 2003 ¹³⁴ UK	Secondary analysis of routine data. Compares staff types	In and OOH urgent care; Children; Nurse	To determine if there are differences in call length and outcomes of children presenting by telephone when triaged by different types of nurses	Mean call length of the Registered Sick Children's Nurses was significantly shorter than Registered Nurses ($P < 0001$). Except for referrals for routine appointment with a GP, both types of nurse referred to other triage outcomes groups with equal frequency.
Grant, 2002 ¹³⁵ UK	Observational study using standardised patients. Compares settings: walk-in centres, GPs, and NHS Direct.	In and OOH primary and urgent; Nurse/Face to face and telephone	To compare the quality of clinical care in Walk-in centres with that provided in general practice and by NHS Direct.	Walk-in centres had a significantly greater mean score for all scenarios combined than general practices (difference between groups 8.2, 95% CI 1.7 to 14.6) and NHS Direct (10.8, 5.5 to 16.1). In contrast to general practices, Walk-in centres and NHS Direct referred a higher proportion of patients (26% and 82%, respectively)
Hogenbirk, 2004 ¹³⁶ Canada	Retrospective analysis of call transcripts: Compares views on	In and OOH urgent; Nurse	To assess the appropriateness of advice given by teletriage nurses	In 56% of the 73 calls, all three auditors judged the nurse's advice as "appropriate." In 92% of the 73 calls, at least two of the three auditors judged the teletriage nurse's advice as "appropriate." All calls were rated as "appropriate" by at

Author; Year; Country	Study design	Population and setting	Purpose	Main findings
	appropriateness by different staff (Nurse, Nurse Practitioner, GP)			least one auditor. If not “appropriate,” then auditors were three times more likely to rate the advice as “overly- cautious” rather than “insufficient.”
O'Cathain 2004 ¹³⁷ UK	Mixed methods study. Semi- structured interviews with 24 nurses. Multilevel analysis of 60794 calls triaged by 296 nurses. Compares different types of nurses	In and OOH urgent; Nurse; NHS D	To determine whether nurses with different clinical backgrounds make different triage decisions in NHS Direct	The proportion of calls triaged to self-care was 40% varying by individual nurse from a 10th centile of 22% to a 90th centile of 60%, (adjusted for age, sex, time of the call). Variability was partly explained by length of clinical experience and type of software used: nurses with >20 years clinical experience were more likely to triage callers to self- care than those with < ten years experience (42% versus 36%, respectively; OR = 1.41, 95% CI 1.13, 1.78). Proportions triaged to self-care differed by type of clinical decision support software used: 31%, 37% and 44%.
McKinstry, 2009 ¹³⁸ UK	Retrospective analysis of audio recordings: Compares	Primary care/Urgent . Doctor	To investigate whether there are differences in quality and safety of family doctors'	Telephone consultations were shorter (4.6 vs 9.7 min, p<0.001), presented fewer problems (1.2 vs 1.8, p<0.001) and had less data gathering, counselling/advice, rapport building (all p<0.001) than face-to-face consultations.

Author; Year; Country	Study design	Population and setting	Purpose	Main findings
	telephone and face to face		telephone and face to- face consultations	Telephone consultations were less likely to include enough information to exclude serious illness. Patient involvement and satisfaction were similar for both groups.
Barber, 2000 ¹³⁹ USA	Blinded Delphi review of medical appropriateness. Compares telephone referral advice and other source referrals with Physician view	Paediatric; Hospital; Nurse telephone advice	To examine the appropriateness of referrals to a paediatric ED by the Paediatric Health Information Line (PHIL), a hospital-based telephone service versus other referrals	Physicians reviewed 133 consecutive ED telephone referrals and 260 randomly selected control patients seen in ED for medical appropriateness. The telephone group had an appropriateness rate of 80.2%, compared with 60.5% for the control group (chi(2) = 14.6369; odds ratio = 2.65; 95% confidence interval [1.5759,4.5008]). For the period studied, PHIL referrals to the ED had a 33% higher rate of appropriateness than controls.
Doctor, 2013 ¹⁴⁰ USA	Retrospective observational study. Expert review of telephone nurse ED referrals	OOH urgent; Paediatric; Nurse	To identify non- essential after hours referrals made by telephone nurses	73/220 patients (33%) were classified non-essential and 67% as essential. Nonessential referrals were significantly younger (p <0.05), had lower triage scores (p=0.026) and shorter ED stays (p<0.0001). The algorithms for 'Fever - 3 months or Older' (12.3%), 'Vomiting Without Diarrhoea (8.2%) 'Trauma - Head' (8.2%), 'Headache' (6.8%) and 'Sore Throat' (5.5%)

Author; Year; Country	Study design	Population and setting	Purpose	Main findings
				were determined most likely to result in a non-essential referral
Huibers, 2012 ¹⁴¹ Netherlands	Secondary analysis of telephone consultations by nurses at 29 centres. Compares quality of consultation vs appropriateness of decisions	OOH Nurse telephone helpline	To explore the impact of quality of consultation and estimated urgency on the appropriateness of decisions.	90% of 6739 callers were non-urgent. Most decisions were appropriate (91% urgency, 96% follow-up advice, 95% timing). Higher quality consultation was related to more appropriate estimates of urgency [OR= 1.8; 95% CI: 1.7–1.95], follow-up advice (OR = 2.7; 95% CI: 2.4–3.0) timing (OR=2.4; 95% CI: 2.2–2.6). High urgency was associated with suboptimal consultation quality.
Earnesater, 2010 ¹⁴² Sweden	Retrospective study of incident reports;	In and OOH Urgent; Nurse	To conduct a retrospective study of incident reports from the national, nurse-led telephone triage system in Sweden	The 426 incident reports included 452 errors. Of the analysed incident reports, 41% concerned accessibility problems, 25% incorrect assessment, 15% routines/ guidelines, 13% technical problems, 6% information and communication. Most frequent outgoing incident reports (i.e. sent from SHD to other health-care providers) concerned accessibility problems & most frequent incoming reports (i.e. sent to SHD

Author; Year; Country	Study design	Population and setting	Purpose	Main findings
				from other providers) concerned incorrect assessment.
Snooks, 2009 ¹⁴³ UK	Multi method (postal questionnaire & expert review). Compares necessary vs un- necessary & sufficient vs in- sufficient advice	In and OOH emergency and urgent care; Nurse; NHSDW	To describe the appropriateness of advice and healthcare contacts made following calls	Over 80% of callers rated advice as appropriate. The clinical panel rated over 80% of callers as having taken necessary and sufficient actions following their calls. From two caller groups the clinical panel identified un-necessary advice was given to 17.1% and 11% of patients and insufficient advice was given to 1.4% and 3.3%.

Summary of findings

A summary of the main characteristics of all included studies, excluding systematic reviews is given in Table 8.

Table 8 Main characteristics of included studies on telephone triage & advice

N = 75 studies	N (%)
Country	
USA	25 (33%)
UK	28 (37%)
Other Europe	12 (16%)
Other	10 (13%)
Study design	
RCT	7 (9%)
Observational	12 (16%)
Interviews	3 (4%)
Retrospective	27 (36%)
Controlled	1 (1%)
Before and after (uncontrolled)	4 (5%)
Before and after (controlled)	1 (1%)
Mixed/multi-method	6 (8%)
Other	14 (19%)
Staff	
Dr	7 (9%)
Nurse	56 (74%)
Non-clinical	4 (5%)
Multiple clinical	5 (6%)
Not stated	3 (4%)
Setting	
24 hour urgent	31 (43%) (paediatric = 3)
OOH urgent	25 (33%) (paediatric = 10)
Primary care	8 (11%) (paediatric = 1)
EMS/Ambulance	8 (11%)

N = 75 studies	N (%)
ED	1 (1)
Key themes	
Dr vs Nurse	7 (9%)
Appropriateness/accuracy (advice/ referrals)	29 (39%)
Compliance	20 (27%)
Safety	18 (24%)
Satisfaction	22 (29%)
Costs	11 (15%)
Service impacts (unplanned re-contacts/workload)	20 (26%)
Access	6 (8%)

Staff type comparisons

7 studies (9 papers) reported on telephone triage performed by different staff types.^{73, 93-95, 100, 118-120, 126} There was 2 RCTs, 1 was a controlled trial, 3 prospective observational studies and 1 retrospective study.

Two studies compared the appropriateness of nurse telephone referrals compared with other referral sources.¹¹⁸⁻¹²⁰ Both studies found that GP or physician Emergency Department referrals were more appropriate than either nurse telephone referred or self-referred patients, when measuring appropriateness using clinical criteria.

Two studies directly compared Nurse and Doctor telephone triage.^{73, 94&95} One study reported that nurses were more likely to recommend higher intensity advice than Doctors, but that when the appropriateness of this advice was reviewed by experts the nurse advice was more likely to be appropriate.⁷³ The other study found that callers were significantly more likely to be satisfied if their call was dealt with by a Doctor than a nurse and have higher compliance rates, whilst repeat calls for advice were significantly higher in the nurse group at both 4 hour and 72 hour time intervals.^{94&95} A different study looked at introducing second level physician triage in a nurse telephone system.¹²⁶ Adopting this approach halved the number of out of hours referrals.

One study looked at using telephone advice given by nurses and paramedics for low urgency ambulance services.¹⁰⁰ They found that nurses were more likely to triage calls as not requiring an ambulance. The 330 cases triaged by a nurse or paramedic as not requiring an

emergency ambulance were less likely to attend ED but 9% of these patients were admitted to a hospital bed. The only included study of a service using non-clinical call handlers supported by clinicians was the evaluation of NHS 111 pilot sites¹⁰⁶ but no comparison was made of decision making by non-clinical call handlers and clinicians.

Safety

18 studies reported on safety of telephone triage. The related systematic review by Huibers⁶³ included 10 of the papers identified in this review^{67,74,75,78,79,83; 90-93} and reported that a high proportion (97%) of all out of hours telephone triage contacts were safe but that the proportion of safe contacts decreased when looking at high urgency patients. From 10 studies using high-risk simulated patients the authors found that just 46% were safe, bringing into question whether telephone triage and advice is as safe for higher urgency patients.

Of additional studies not reported in the Huibers review, one study also found that more safety issues were associated with higher urgency calls¹⁴¹, and two studies, one set in primary care⁶⁹ and one set in EMS care¹⁰⁴ both reported no adverse outcomes or differences in sub-optimal outcomes for high urgency calls.

One study looked at characteristics of calls coded as low urgency that resulted in death.¹⁰⁵ The authors found that these calls related to older people who did not make the call themselves. The calls were short, did not always conform to the system protocol and non-life threatening symptoms were reported. This concurs with the findings from a primary care based study¹³⁸ which found that telephone consultations were shorter and did not include sufficient information to exclude serious illness. However, a study by Snooks¹⁴³ reported that the overall proportions of patients who receive insufficient advice was low (1.4% - 3.3%). Based on the information from a study which analysed the incident reports from errors, 25% of errors related to incorrect assessment.¹⁴²

Compliance

21 studies reported on compliance with telephone triage advice recommendations. There were also two systematic reviews that reported on compliance (Blank^{58&57}, Purc-Stephenson⁵⁹) and these reviews contained 13 of the studies identified in this review.^{68,77,78,80,82,84,86,88,89,92,94,95,97} Blank et al⁵⁷ reported that compliance ranged from compliance ranged from 56–98% and Purc-Stephenson reported an overall compliance rate of 62%⁵⁹ but that compliance rates differed by the type of advice received, with 63% complying with advice to attend A&E, 44% complying with a primary care referral and 78% complying with self-care

advice. Of the studies not included in the systematic reviews, three studies reported compliance that was within the range identified by Blank *et al.*^{67,112,133} One study (201) identified a 20% refusal of telephone triage recommendations, whilst another¹²⁴ reported that callers may interpret advice differently from how it is intended, resulting in unintentional non-compliance. Compliance with advice provided by callers to NHS 111 was 86%.¹⁰⁷ A qualitative study reported that compliance may be improved when callers feel involved in the decision making.¹³⁰

Satisfaction

Twenty two studies reported satisfaction data.^{67, 68,70-72,80,87,88, 94-96,98,102-104,107,110,111,121, 122, 128,130,138} Satisfaction with telephone triage and advice services ranged from 55% - 97%. Dissatisfaction ranged from 2.3% - 18.3%. Dissatisfaction was higher for EMS based studies where patients may have expected to receive an ambulance and instead received telephone advice. Qualitative research suggests that patients value feeling involved in the decision making, if the manner of the call handler is calm, friendly and respectful^{122,130} and that patients feel it is a useful backup service where they can avoid being labelled as ‘time wasters’.¹²²

Where telephone advice provided by different staff types was compared, patients reported less satisfaction with nurse led services compared to doctor led services.^{94,95}

Costs

9 studies reported costs or cost savings.^{76,80, 87, 102, 109-113, 127} The most common method of calculating and reporting costs was to report costs saved from callers change in subsequent health care seeking behaviour as a result of the call.^{76,80,109, 111} These were not consistently reported and were reported as average per patient savings; cost savings per call recommendation type; annual net savings and overall reduction, making comparison difficult. Two studies reported costs related to introducing a nurse telephone line for low urgency ambulance patients.^{102,113} One of these studies¹¹³ reported a cost reduction of £4,520,000 from reduced ambulance dispatch and one¹⁰² reported reductions in costs due to reduced ambulance cycle times and fewer admissions to hospital. Only one study reported a cost increase and this related to the cost of the General Practice telephone bill after the introduction of a telephone service.⁸⁷ A cost consequence analysis conducted as part of the evaluation of NHS 111 pilot sites estimated the service might potentially save the NHS £2.4million a month although this was based on limited cost data and considerable assumptions.¹⁴⁴

Service impacts

Seventeen studies reported impacts on their own service or other services, either from increased or reduced service use and or increased or reduced staff workload^{69-71, 87, 96, 99, 100, 102-104, 106, 110, 113, 115, 123, 127, 135}

One study found that NHS Direct referred a higher proportion of patients to other services when compared to general practice.¹³⁵

An RCT by Lattimer reported a 38% reduction in primary care appointments and a 23% reduction in home visits⁶⁹, whereas another study reported no change in primary care appointments but home visits reduced by 18%.⁷¹

A number of studies reported that Doctor workload fell after the introduction of a telephone service. One study reported a reduction in workload of 54% compared to the previous 3 months⁷⁰ and that nurses were able to handle 26% of requests for GP appointments by telephone, whilst another study reported a 39% reduction in demand.⁸⁷ However, other studies have found that whilst a telephone advice service may reduce demand for face to face appointments in the first instance, patients consult their GP more frequently in the subsequent weeks.⁹⁶ In particular, older patients were more likely to have follow up contacts after receiving telephone advice.¹¹⁵ The evaluation of NHS 111 pilot sites found no impact on attendances at ED and contacts with urgent primary care services but a statistically significant increase in ambulance incidents.¹⁰⁶

Five studies found that the introduction of a telephone advice service for low urgency ambulance service patients resulted in fewer ambulance responses being required.^{100, 102-104,}

¹¹³ However some studies reported high call return rates, where calls are passed back for an ambulance response or that not as many calls as expected could be resolved by telephone.^{102, 103}

Accuracy and appropriateness

Twenty six studies reported data on the appropriateness or accuracy of telephone triage and advice services. The systematic review by Blank⁵⁷ also reported on appropriateness and 11 of the studies identified here were also included in the review by Blank.^{74, 76-78, 81-83, 85, 89, 91}

This review identified that triage decisions rated as appropriate varied between 44–98%.

However many different definitions of appropriateness were used and this leads to difficulty when trying to compare results.

From the 15 other studies^{73, 90, 101, 102, 116-120, 125, 132, 136, 139-141}, four studies looked at the appropriateness of ED referrals. In terms of referral sources, no difference was found

between telephone and self-referred patients¹¹⁹ but that doctor referred patients were the most appropriate referrals.¹¹⁸ One study identified 33% of ED referrals as non-essential¹⁴⁰ and another identified that a high proportion of ED referrals should be handled in primary care.¹¹⁷

Most studies reported that a high proportion of referrals were appropriate and these were often in excess of 90%.^{132, 141} Triage advice and referrals were more likely to be unnecessary rather than insufficient.¹⁴³ However, one study identified that acute and non-urgent scenarios were more likely to be classified correctly than urgent¹¹⁶.

Where low urgency ambulance calls were passed for telephone advice there was a high return back rate for an ambulance response.¹⁰²

Quality

There is a large evidence base on telephone triage and advice, but studies are dominated by retrospective studies and observational designs with only a small number of randomised trials (8). This reflects the difficulties inherent in conducting randomised studies in this environment particularly if the service being investigated is in a single site. Individual studies and systematic reviews assessed a range of different outcomes and only one systematic review conducted a meta-analysis for a single outcome, compliance.⁵⁹ Broad, relevant quality issues identified by the authors of systematic reviews and individual studies include;

- Different definitions of appropriateness and methods for measuring this outcome
- Different methods for measuring patient satisfaction
- Different clinical assessment systems used to triage calls
- Differences in operational design – 24 hour services versus those only available out of hours
- Differences in the wider healthcare settings services have operated in with consequent variation in the availability of alternatives to ED care such as primary care services.

The consequence is a wide variation in the range of reported outcome results, for example the systematic review by Blank⁵⁸ found assessment of appropriateness ranged from 44% to 98%, which makes it difficult to make comparisons between studies and draw firm conclusions about the strength of evidence for some specific outcomes.

Conclusions

There is an existing, substantial evidence base about the operational and clinical effectiveness of telephone based triage and advice services for management of requests for urgent healthcare. We have identified 87 relevant papers from 83 studies, including 8 systematic reviews, reporting a range of outcomes. The most commonly reported outcomes were concerned with accuracy & appropriateness of decision making, patient compliance with advice, safety of decision making and patient satisfaction. Despite the limitations outlined above, some general conclusions can be made about these aspects of telephone triage and advice services.

- Accuracy of decision making is generally high with respect to minimising risk. Similarly, despite wide variation in reported assessments of appropriateness overall, the proportion assessed as appropriate was high in the majority of studies. Where calls have been judged to have been inaccurately or inappropriately triaged the tendency is to assign calls to a higher level of care than needed rather than a lower level. What is less clear is whether this is a function of the triage assessment systems, the individuals using the system or a combination of the two. With the exception of one early NHS Direct study we have found no research that has compared the performance of different telephone triage clinical assessment systems.
- A consequence of this apparent inherent risk averseness does mean that overall telephone triage systems appear to be safe although this may not be efficient. In the small number of studies where adverse patient events or outcomes have been measured these are very low.
- Reported compliance is also variable but overall tends towards a high level although this varies depending on advice given with self-care or ED visits appearing to have higher compliance than advice to contact primary care. This may reflect patient perceptions and preferences and would align with the evidence described in chapter 3 around patient perception of perceived difficulty in accessing primary care.
- Patient satisfaction with telephone triage is generally high and the service well liked by users. Although only a small number of studies compared nurse led services with doctor led services, satisfaction appears to be higher in doctor led services.

Other outcomes or aspects of service delivery have been less well investigated and warrant further study.

- Only 17 of the included papers assessed the impact of telephone triage and advice services on other services associated with emergency or urgent care. The majority of these studies only assessed impact on single other services (for example ambulance responses, ED attendances, primary care attendances). With the exception of one US study¹¹⁰ that assessed impact on both ED attendances and primary care activity, only the UK based studies of NHS Direct⁶⁷ and NHS 111¹⁰⁶ have attempted to assess the impact of telephone services on multiple services within the emergency and urgent care system. Whole system impact is a key outcome if one objective of telephone based services is to contribute to improving system efficiency.
- The included studies were predominantly concerned with nurse led telephone services. Only 9 papers from 6 studies explored the effects of different types of staff delivering these services. Most of these compared nurse or doctor led services, one compared nurses and paramedics and 2 papers from one study assessed lay operators in a GP out of hours setting. The findings from these studies were mixed with some reporting no differences in appropriateness of decisions between nurses and doctors whilst other found nurses more likely to refer to higher level care than doctors. Acute problems and non-urgent problems appear to be more accurately identified than urgent problems suggesting the latter are more difficult to assess and there is a suggestion higher level clinician assessment may improve accuracy for these problems. Only one study investigated two level triage, (nurse assessment followed by doctor assessment), for a subset of calls. The broad area of optimum skill levels and mix of clinicians and non-clinicians has not been addressed.
- Few studies have examined the costs associated with telephone triage and advice services and these have taken different approaches to estimating and reporting costs which makes comparison difficult. The financial benefits of these services both at an individual service and whole system level remain unclear.
- Given that a primary objective of telephone triage and advice services has been to improve and simplify access to urgent care there is remarkably little evidence about the impact of these services on access. Only 5 included studies examined impact on access.

These 4 evidence gaps are of particular relevance to the continued development of the NHS 111 service within the NHS. Assuming that NHS 111 will continue to be a principle entry

point for access to urgent care and that the existing clinical assessment system (NHS Pathways) will remain unchanged, the key challenges are based around improving the existing service so that it can fulfil the intended objectives. It is worth remembering that the scale and scope of the NHS 111 service is much greater than the services included in the existing evidence including its predecessor NHS Direct. It is also the case that there have been significant technological advances over the 20+ years that the evidence spans and so evidence from early studies may lack relevance now. Previous services have mostly been small in scale and intended to provide advice and some direction about what service people should access.

The vision for NHS 111 is that it provides broader functions including health information, signposting to other services where patients can take themselves, direct referral to other services on behalf of the patient including ambulances (where needed) and appointments made in real time, and advice. Good decision making at the time of the call is therefore key to an efficient and effective service. The most pressing research issue is therefore that around staffing the NHS 111 service. NHS 111 is unique in that it is a national telephone urgent care access service where the first assessment is made by non-clinical call handlers. The only evidence on impact of using non-clinical call handlers is the existing NHS 111 evaluation studies of pilot services. Qualitative research examining the role of non-clinical call handlers found the work had more in common with clinical work than other call-centre work and the requisite skills need to be carefully incorporated in to training.¹⁴⁵ These call handlers are supported by nurse or paramedic clinicians and the NHS England review has stated that the addition of senior (doctor) clinicians to NHS 111 will be considered as part of the ongoing development of the service. Changes to the staffing profile of NHS 111 call handling services will provide a unique opportunity to address the questions around impact of different types of clinicians on accurate and appropriate call assessment and the proportions needed to provide an efficient service. Additional specialist clinical skills such as mental health specialists and pharmacists could also potentially be added to the mix. Adequate follow up of callers would be needed to assess if care pathways are shortened and care really is provided in the right place, at the right time, from the first call and also that access improves. The early research on NHS 111 found it did not substantially change the way the population accesses urgent care but this may have changed since it became a national service.¹⁰⁸

Alongside this, the impact of different staffing models on whole system activity can be measured. NHS 111 has been criticised as referring too many patients inappropriately to

higher level ambulance and ED care. The early evaluation of pilot sites did show an increase in ambulance incidents after the introduction of NHS 111 (the reasons for which remain unexplained) but not ED attendances.¹⁰⁶ More detailed evaluation of the accuracy and appropriateness of call assessment decisions would answer some of these questions and identify where there is scope to improve it either through changing the staffing profile or modifying the clinical assessment system.

Changes to the staffing profile, particularly addition of doctors and/or increasing the proportion of clinical advisors, and increased IT infrastructure to support real time referrals will incur costs which will need to be offset by improving whole system efficiency. Robust economic evaluation alongside other changes would provide evidence about the associated costs of providing this complex service, whether it provides value for money and the necessary cost shifting within the emergency and urgent care system needed to plan and support the service in the future.

Finally, evaluation of improvements in the NHS 111 service itself together with measurement of whole system changes in volumes of activity in different associated services and some specific population based research would also begin to address issues about access and whether the service produces real changes and improvements in the way people access urgent care.

Chapter 5 - Management of patients with urgent care problems by ambulance clinicians outside hospital

Introduction

Another key principle of the NHS England review is to provide more urgent care services away from hospitals and so encourage people not to choose A&E services. . Enhancing urgent care outside hospital involves a range of services including GP's, primary care and community services, community pharmacists and ambulance paramedics. There was not scope to consider all of these services within the timeframe for this review. Particular emphasis has been placed in the NHS England review on development of the ambulance service by extending paramedic training and skills so they can manage more people on scene and avoid unnecessary journeys to hospital to achieve this objective. We have therefore focussed our rapid review for this principle on identifying and summarising the existing evidence around initiatives implemented by the ambulance service to support this objective.

Methods

The main inclusion and exclusion criteria, search strategies and review process have been described in Chapter 2. Searches were conducted for the years 1995-2014. For this review specific additional inclusion and exclusion criteria were studies investigating;

Inclusion criteria

- Extended care paramedics ('community paramedics', advanced paramedics', 'paramedic practitioners', 'emergency care practitioners').
- 'Treat and refer' (to community setting)
- 'Treat and leave'
- Emergency Department avoidance
- Conditions which could be managed at home/in the community

Exclusion criteria

- Acute conditions requiring hospital care

Review process

Studies were identified from database searching and through expert knowledge of the field of interest. In addition to the studies identified through database searching the study team identified 10 additional studies and these were assessed for inclusion in this review. A randomly generated 10% sample of studies from the database searches (n=462) was double sifted by another member of the study team. The reviewers initially agreed on inclusion or exclusion for 97% of studies. The remaining 12 studies were discussed with a third reviewer; of these, six were included and six excluded. The results of the review sifting process are given in Figure 4.

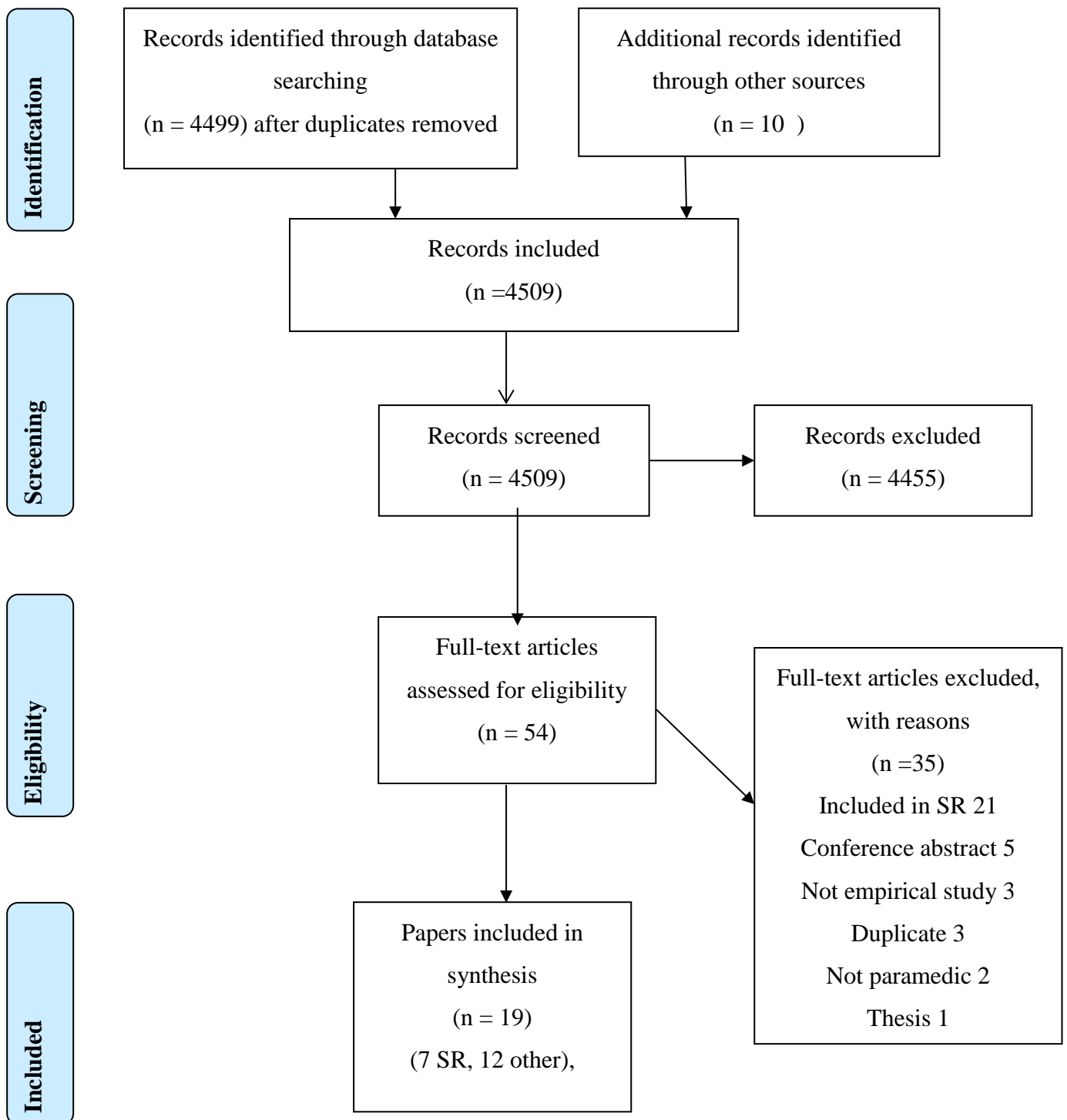


Figure 4 PRISMA flow diagram for ambulance management in the community searches

Results

We identified 7 relevant systematic reviews and within these 64 papers from 57 studies were included although only 21 of these papers met the inclusion criteria for this review. We also identified an additional 12 primary studies not included in the systematic reviews. Formal data extraction was not undertaken for the 21 papers meeting the inclusion criteria and included in systematic reviews as this would have been conducted during the review process. Table 9 lists these 21 studies and which systematic reviews they were included in.

Table 9 Papers included in more than one systematic review

Primary study	Bigham 2013 ¹⁴⁶	Cooper 2009 ¹⁴⁷	Evans 2014 ¹⁴⁸	Hill 2014 ¹⁴⁹	Mikolaizak 2013 ¹⁵⁰	Tohira 2014 ¹⁵¹
Adams 2005 ¹⁵²		✓		✓		
Coates 2012 ¹⁵³				✓		✓
Cooper 2004 ¹⁵⁴	✓	✓		✓		✓
Cooper 2007 ^{155, 156}				✓		✓
Cooper 2008 ¹⁵⁷	✓	✓		✓		✓
Department of Health 2004 ¹⁵⁸		✓		✓		
Dixon 2009 ¹⁵⁹	✓		✓			✓
Gray & Walker 2008 ¹⁶⁰				✓	✓	✓
Halter 2006 ¹⁶¹		✓		✓		✓
Halter 2008 ¹⁶²				✓		✓
Knowles 2011 ¹⁶³			✓			✓
Mason 2006 ¹⁶⁴		✓		✓		
Mason 2007 ¹⁶⁵	✓	✓	✓		✓	✓
Mason 2008 ¹⁶⁶	✓					✓
Mason 2007 ¹⁶⁷		✓		✓		✓
Mason 2012 ¹⁶⁸				✓		✓
O'Hara 2012 ¹⁶⁹				✓		✓
O'Keeffe 2011 ¹⁷⁰	✓			✓		
Shah 2010 ¹⁷¹	✓		✓			
Stirling 2007 ¹⁷²		✓	✓			

Studies fall in to two broad groups; those concerned with a focus on investigating expanded professional roles for pre-hospital care providers (predominantly ambulance paramedics) and those focussed on investigating alternatives to transport to ED which encompasses broader professional groups not just those with enhanced skills.

We have summarised the characteristics and findings of the 7 systematic reviews (Tables 10 & 11). Data on the 12 papers not included in the systematic reviews were extracted in to summary tables (Tables 12-14).

Table 10 Summary of systematic reviews related to expanded roles and management of patients outside hospital

Author; Year	Study design	Population & Setting	Purpose	Main findings
Bigham 2013 ¹⁴⁶	Systematic review of research articles (any design). Search of 3 databases from January 2000 to September 30 2011	Extended scope paramedics working in any type of community paramedic programme	Impact of extended scope paramedics on any patient-related or system-related outcome. Reported outcomes included clinical indicators (ED attendance and length of stay); operational outcomes (time on task and transport rates); patient satisfaction; economic impact; safety; and attitudes and satisfaction of paramedics with training	Eleven articles were included (1 RCT). Community paramedic programmes in the UK, Australia and Canada appeared promising. UK RCT showed benefits for paramedic practitioners over standard care paramedics. Role of CPs is currently unclear and desired outcomes need to be established by consensus. Areas for research included safety of CP programmes; dispatch algorithms to identify patients needing CP services; and deployment models for CP units
Cooper 2009 ¹⁴⁷	Systematic review. Three databases, plus Google, Google Scholar and Journal of Emergency Primary Health Care were searched to July	Ambulance, nursing or medical staff with extended roles in out of hospital emergency care	Appraisal of evidence on impact of new and emerging out of hospital clinician roles on conveyance rates, immediacy of treatment and referral, patient satisfaction, cost savings and inter-professional working	Thirty-four articles were included, with 14 empirical studies analysed in detail. Authors concluded that ECP and PP roles significantly improve conveyance rates, treatment and referral rates and patient satisfaction, with some evidence of financial savings. Areas for research included safety; barriers to implementation; and cost-benefit trade-offs of

Author; Year	Study design	Population & Setting	Purpose	Main findings
	2008			investment in education and training vs. efficiencies within the health economy
Evans 2014 ¹⁴⁸	Systematic review. Six bibliographic databases and various grey literature sources were searched from 1990 to March 2012	Paramedics with extended skills; UK ECPs were excluded	Identify evidence of paramedics trained with extra skills and the impact of this on patient care and related services. Skills defined by the British Paramedic Association's core paramedic competences and associated outcomes	Nineteen articles were included. Authors concluded there is evidence for paramedics assessing and managing patients autonomously to reduce ED conveyance and that this is acceptable to patients and carers. Areas for research included paramedics working with GPs; paramedic referral to hospital departments other than the ED; and paramedics assessing and managing minor acute conditions in elderly patients.
Hill 2014 ¹⁴⁹	Systematic review. Five bibliographic databases plus Google, Google Scholar and the Department of Health website were searched to August 2012	ECPs in any UK setting	Summarise evidence on impact of ECPs on healthcare delivery effectiveness of practice and resource use. Outcomes included staff or patient perceptions of the acceptability or performance of the ECP role; healthcare costs; clinical working practices of ECPs	15 peer-reviewed articles and 6 project reports included. There was support from patients and staff for ECP services. A number of high quality studies reported care processes provided by ECPs as being equivalent to or better than those provided by staff with traditional roles. Prehospital ECPs reduced unnecessary referrals to EDs. Further research needed to establish whether

Author; Year	Study design	Population & Setting	Purpose	Main findings
				apparent cost savings associated with ECPs apply across all operational settings and patient groups.

Table 11 Summary of systematic reviews related to alternatives to ED and management of patients outside hospital

Author; Year	Study design	Population & Setting	Purpose	Main findings
Brown 2009 ¹⁷³	Systematic review and meta-analysis. Search of 3 databases to February 2008	US paramedics; Patients for whom 911 or similar emergency call was activated and ambulance transport requested	Comparison of paramedic determinations of need for transport with a reference standard. Primary outcome was NPV of paramedic determinations; other diagnostic accuracy outcomes also reported	Five articles were included, of which only 2 reported full accuracy data. Pooled NPV was 0.91 (95% CI 0.71 to 0.98). Authors concluded there is insufficient evidence to support paramedics determining whether patients need ambulance transport. No explicit research recommendations provided
Mikolaiz k 2013 ¹⁵⁰	Systematic review. Six bibliographic databases plus reference lists of included studies were searched to December 2011	Emergency ambulance services; older people (60 years and older) who have fallen	Summarise evidence on non- conveyance, outcomes following non- conveyance and outcomes from alternative care pathways for older people following a fall.	Twelve studies included. Non-transportation rates ranged from 11% to 56%. Non-transported people were likely to access health care following the incident fall: up to 49% had unplanned health care contact within 28 days of the initial fall. One study reported that ECPs reduced subsequent hospital admission compared with standard ambulance crews. Authors recommended research to explore non-ED pathways that can support ambulance services' decision-making around transportation.
Tohira	Systematic review	Extended role	Assessment of impact of new pre-	Thirteen studies (20 articles) were included. Meta-

2014 ¹⁵¹	and meta-analysis of comparative studies. Four bibliographic databases searched from 2002 to early 2013. Supplementary search of Emergency Medicine Journal contents and article reference lists.	prehospital practitioners (NPPs), including ECPs, PPs and extended care paramedics; patients who sought an ambulance service	hospital practitioner roles on number of patients discharged at the scene; number transported to the ED; subsequent ED attendance; and appropriateness of care provided/decisions made	analysis showed that NPPs were less likely to take patients to the ED and more likely to discharge them at the scene than standard ambulance crews. Pooled ORs: 0.09 (95% CI 0.04 to 0.18) for transport to ED and 10.5 (95% CI 5.8 to 19) for discharge at the scene. Most studies did not control for important confounders. Evidence for subsequent ED attendance and appropriateness of care was unclear. Areas for research included safety of patients attended by NPPs and impact (if any) of NPPs in alleviating ED crowding
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CP: community paramedic; NPV: negative predictive value; ECP: emergency care practitioner; PP: paramedic practitioner; ED: emergency department; NPP: new prehospital practitioner; OR: odds ratio; CI: confidence interval

Table 12 **Summary of qualitative studies of decision-making**

Author, Year, Country;	Study design	Population & setting	Purpose	Main findings
Burrell, 2013 ¹⁷⁴ UK	Qualitative interview study	Ambulance staff working in south London	To assess the decision- making process by ambulance staff managing patients with epilepsy	Interviewees (15) stated that complex seizures that self-resolve are difficult to triage. They reported insufficient training and guidance and relied on experience to guide their decisions. Transport to hospital was encouraged by fear of possible litigation, patient expectation and lack of access to patient information or alternative care pathways. Authors concluded that improved guidance should be developed
Halter 2011 ¹⁷⁵ UK	Qualitative interview study	Ambulance staff in London	To understand the decision-making process of emergency ambulance staff with older people who have fallen	Twelve staff participated in semi-structured interviews. Thematic analysis revealed a similar assessment and decision-making process among participants. This was complex and involved predominantly informal decision-making processes. Need for further support was highlighted. Authors recommended research into how new care pathways offering alternatives to ED may influence decision-making
O'Hara 2014 ¹⁷⁶ UK	Qualitative study using multiple	Ambulance service staff working in 3 different NHS	To examine influences on safe decision-making by ambulance staff to identify	NHS system was characterised as fragmented and inconsistent. Pressure to reduce transport to EDs intensifies the need for appropriate training but operational demands were seen as

Author, Year, Country;	Study design	Population & setting	Purpose	Main findings
	methods	ambulance trusts	areas for intervention and for further research	conflicting with this. Perception of the ambulance service as primarily a transport service was seen as a barrier to working across professional and service boundaries

Table 13 Studies of ambulance clinicians decision-making accuracy (with or without decision aids)

Author, Year, Country	Study design	Population & setting	Purpose	Main findings
Clesham, 2008 ¹⁷⁷ UK	Prospective 'diagnostic accuracy' study	Ambulance staff serving a major urban teaching hospital	To assess the ability of ambulance staff to predict which patients will require hospital admission	Questionnaires completed on arrival at ED (n=396 cases). Staff predicted 182 (46%) would be admitted and 214 (54%) discharged. Actual dispositions 187 (47.2%) and 209 (52.8%), respectively. Sensitivity of predicting admission was 71.7% (95% CI 65 to 78%) and specificity 77% (95%CI 71 to 81%). Ambulance staff showed reasonable accuracy in predicting admission and correctly identifying patients who able to leave.
Cornwall, 2012 ¹⁷⁸ USA	Prospective 'diagnostic accuracy' study	Emergency medical technicians (EMTs) in an urban fire department	To assess EMTs' ability to identify intoxicated people not requiring transport to an ED	Questionnaires completed on arrival at ED (n=197 cases). Overall sensitivity and specificity of identifying those requiring admission were 93% (95% CI 66.1 to 99.8%) and 40% (95% CI 33.3 to 47.9%). Potential for intermediate level EMTs to play an important role in triage of intoxicated patients to ED or alternative sobering facilities.
Newton, 2014 ¹⁷⁹ UK	Service evaluation (diagnostic	Ambulance staff working in North West Ambulance	To evaluate the clinical utility and safety of triage support tools (Paramedic	Paramedic Pathfinder tool applied to 367 medical and 114 trauma patients. Agreement between ambulance staff and 'gold standard' was 80.5%. Sensitivity of the tools was

Author, Year, Country	Study design	Population & setting	Purpose	Main findings
	accuracy study)	Service NHS Trust	Pathfinder tools for medical and trauma patients to assess need for ED care)	94.8% and specificity 57.9%. 20.9% of medical patients and 30.7% of trauma patients transported to the ED could have been safely treated elsewhere. Demonstrated acceptable sensitivity in identifying patients who require ED care.
Schmidt, 2000 ¹⁸⁰ USA	Prospective 'diagnostic accuracy' study	Ambulance emergency medical technicians (EMTs)	To determine whether EMTs can safely apply protocols to assign transport options	EMTs categorised 1,300 patients. Overall sensitivity and specificity for identifying patients needing ambulance transport were 94.5% and 32.8%, respectively. Between 3 and 11% of patients determined at the scene not to need an ambulance had a critical event. EMS systems need to determine an acceptable rate of under-triage
Snooks, 2014 ¹⁸¹ UK	Cluster randomised controlled trial	Ambulance staff attending older patients for a reported fall	To assess the effectiveness, cost-effectiveness and safety of computerised clinical decision support (CCDS) for ambulance staff attending older people who have fallen. Outcomes included referral rates;	Paramedics using CCDS referred 42 (9.6%) patients to falls services, compared with 17 (5.0%) seen by control paramedics [Odds ratio (OR) 2.04, 95% CI 1.12 to 3.72]. No adverse events related to the intervention and no significant differences between groups in subsequent emergency contacts; quality of life and non-conveyance. Average cost £208 per patient with CCDS & £308 without. Ambulance paramedics using CCDS referred twice as

Author, Year, Country	Study design	Population & setting	Purpose	Main findings
			quality of life; job cycle times; contacts; non-conveyance rates and costs.	many patients to a falls service with no difference in safety. CCDS potentially cost-effective, especially in settings with existing electronic data capture

Table 14

Table 6.6 Studies of ambulance interventions to reduce hospital admissions

Author, Year, Country	Study design	Population & setting	Purpose	Main findings
Jensen, 2014 ¹⁸² Canada	Qualitative focus group study	Residents in Long-term care (LTC) facilities	To identify lessons from implementation and operation of a novel paramedic programme to provide onsite emergency assessment and care to long-term care (LTC) residents suffering acute illness or injury.	Twenty-one stakeholders took part in four focus groups. The programme was positive for relationships between EMS and LTC; required additional paramedic training; and could positively affect LTC patient experience of acute medical events. Paramedics found involvement with end-of-life care rewarding
Logan, 2007 ¹⁸³ UK	Service evaluation	Older people not taken to hospital after a fall and attended by an emergency ambulance	Assessment of impact of referral to intermediate care services by ambulance clinicians for older people after a fall. Outcomes measured: referrals to intermediate care service; admissions and deaths of referred patients within 6 months	Fifty-four patients were referred to intermediate care between July 2004 and June 2006. Of these, 21 were accepted by the service. Twelve patients were admitted and 4 died over 6 months. Intermediate care appeared to be acting as a single point of referral and referred people to other services after assessment. Service evaluation with no control group for comparison.

Author, Year, Country	Study design	Population & setting	Purpose	Main findings
Sach, 2012 ¹⁸⁴ UK	Economic evaluation alongside a randomised controlled trial	People aged over 60 who had fallen and called an emergency ambulance but were not taken to hospital	To estimate cost-effectiveness of referral to a community falls prevention service for older people not taken to hospital after a fall	Mean difference in health and personal social services costs was £-1,551 per patient over 1 year (95% CI £-5,932 to £2,829), favouring the intervention group. The intervention group experienced on average 5.34 fewer falls (95% CI -7.06 to -3.62). The mean difference in QALYs was 0.07 (85% CI 0.01 to 0.15) in favour of the intervention group. The community falls prevention service was likely to be cost-effective in this high-risk group.
Walker, 2006 ¹⁸⁵ UK	Service evaluation	People with diabetes who had called an ambulance for acute hypoglycaemia	To evaluate the effectiveness of Ambulance crew referral to a diabetes specialist nurse team on patient satisfaction	38 patients were referred and reviewed by telephone; 30 also required a clinic review. 26 patients returned a satisfaction questionnaire, 88% agreed that their understanding of hypoglycaemia had improved and 73% felt more able to treat a hypoglycaemic episode in future. Referral was associated with high patient satisfaction and improved confidence in dealing with hypoglycaemia

ED: emergency department; EMT: emergency medical technician; LTC: long-term care; EMS: emergency medical services; ECP: emergency care practitioner; QALY: quality-adjusted life year; CCDS: computerised clinical decision support

Summary of findings

The main characteristics of the 33 primary papers (21 papers included in systematic reviews and 12 additional papers) are summarised in Table 15.

Table 15 Characteristics of primary studies on management of patients out of hospital by ambulance clinicians

N = 33 publications	N (%)
Country	
UK	28 (85%)
USA	3 (9%)
Canada	1 (3%)
Australia	1 (3%)
Study design	
‘Diagnostic accuracy’ study	4 (12%)
Interviews	4 (12%)
Survey/questionnaire	5 (15%)
Service evaluation (uncontrolled)	3 (9%)
Cluster RCT	3 (9%)
Economic evaluation alongside RCT	2 (6%)
Focus groups	1 (3%)
Quasi-experimental	3 (9%)
Mixed/multi-method	7 (21%)
Audit	1 (3%)
Principal outcomes	
Insight into decision-making processes	7 (21%)
Accuracy of decision-making	4 (12%)
Referrals/admissions	9 (27%)
Transport to ED	3 (9%)
Cost-effectiveness	3 (9%)
Patient/carer satisfaction	5 (15%)
Other	2 (6%)
Populations covered	
General population or not applicable	19 (58%)

N = 33 publications	N (%)
Older people including those who have fallen	9 (27%)
Long-term care	1 (3%)
Epilepsy	1 (3%)
Intoxication	1 (3%)
Diabetes	1 (3%)
Children	1 (3%)

The majority of related research has been conducted in the UK and 8 of the included papers were outputs from two large studies by Mason and colleagues (Mason 2007, Mason 2012).¹⁶⁵,¹⁶⁸ There were only 2 randomised studies^{165, 181} and one relevant economic evaluation associated with a larger trial of a community falls service.¹⁸⁶ The main outcomes studied were rates of transportation to Emergency Departments, accuracy and safety of decision making and patient satisfaction. Over 50% of studies included the broad emergency ambulance population with specific populations dominated by older people who have fallen. The small number of studies that have considered costs were also associated with the 3 randomised trials highlighted above.

Effectiveness

Six of the systematic reviews^{146-148, 150, 151, 187} found evidence that pre-hospital professionals can successfully reduce the number of patients transported to ED and provide autonomous care and appropriate referral in the community setting. The evidence is predominated by schemes to provide ambulance paramedics with extended and enhanced clinical skills. Two studies^{160, 165} showed that hospital admissions were also reduced in patients managed at home by paramedic practitioners and that patients managed at home had no more subsequent health contacts (Mason 2007).¹⁶⁷

Some of the UK studies^{154, 157, 161, 168} involved Emergency Care Practitioners (ECPs), a role open to other health care professionals such as nurses, although in reality dominated by ambulance paramedics, and practiced in settings other than ambulance services. The review by Evans¹⁴⁸, which was concerned only with paramedics with extended skills, excluded studies of ECPs. The title “ECP” has created problems as the generic “practitioner” part of

the title proved confusing. It conflicts with the regulators ability to ensure patients know who is treating them and was opposed by paramedic professional bodies.¹⁸⁸ The title ECP has been replaced (for paramedics) with titles listed in the paramedic career framework such as specialist and advanced paramedic.¹⁸⁹

A smaller number of studies have investigated if ambulance clinicians other than those with advanced skills can manage patients out of hospital and reduce transports to ED. Snooks¹⁹⁰ evaluated “treat and refer” protocols for paramedics and found these did not increase the number of patients left at home. More recently, a trial of computer decision support software to aid paramedic on scene decision making about referral to a falls service has shown some promise in increasing the number of patients referred and left at home although the numbers included in the study were small.¹⁸¹

Where measured, the evidence on patient satisfaction and acceptability of initiatives to manage patients out of hospital and closer to home is positive. The UK studies on paramedic practitioners and ECPs^{165, 168} found patient satisfaction was higher in the groups receiving care from the advanced practitioners than those receiving usual care and other study of ECPs also found high levels of patient satisfaction¹⁹¹ and that patients found advice and explanations were clearer (Halter 2006, 2007).^{161, 191} A positive effect for carers has also been reported.¹⁹² Another study found patients left at home following an episode of diabetic hypoglycaemia and referred to a specialist nurse found high patient satisfaction and increased confidence in managing future episodes.¹⁸⁵

Only a small number of studies have examined costs but where an economic evaluation has been done management of patients by ambulance clinicians out of hospital has been reported as having lower costs and likely to be cost-effective when compared to conventional hospital care.^{167, 181, 186, 193}

Safety and decision making

Reducing transports to hospital is linked to safe and appropriate decision making. Studies of advanced practitioners have shown that decision making is generally safe and appropriate.^{161, 166, 169} A number of studies have also examined the accuracy of ambulance clinician decision making around whether or not to transport to hospital for the wider workforce and not just paramedics with advanced skills. The systematic review by Brown¹⁷³ assessed the evidence on paramedic decision making about need for transport and concluded there was insufficient

evidence to establish whether paramedics can accurately determine who needs transport.

However, only 5 papers were included in this review.

More recently, one UK study has assessed the ability of ambulance staff to predict which patients need hospital admission and found they showed reasonable accuracy in determining who needed admission and could correctly identify patients who did not¹⁷⁷ A US study assessed EMTs ability to identify intoxicated people who did not need transporting to hospital and found there was potential for EMT's to accurately triage patients to alternatives to ED.¹⁷⁸ Another recent UK study evaluated the utility and safety of a triage support tools (Paramedic Pathfinder) for deciding which medical and trauma patients needed transporting or could be left at scene.¹⁷⁹ Sensitivity was high with reasonable specificity however the tools were used in shadow form (all patients were still transported) and there is currently no published evaluation of the tool in real practice.

A small number of more recent qualitative studies have provided some valuable insight in to the difficulties associated with the decision making processes faced by paramedics and advanced paramedic practitioners when deciding whether or not to transport patients. A detailed study on safety and decision making by ambulance staff highlighted that as the need to reduce transports to hospital increased the requirement for appropriate training and education to equip ambulance clinicians for this role also increases.¹⁷⁶ Two studies on decision making by ambulance staff for patients with epilepsy¹⁷⁴ and elderly fallers¹⁷⁵ both identified a need for additional training and support to aid safe decision making as did one Canadian study focussed on management of patients with long term conditions out of hospital.¹⁸²

Implementation of initiatives

Some studies have highlighted the challenges, facilitators and barriers to implementation of initiatives to enable ambulance clinicians to manage more patients out of hospital although these aspects of service provision are less well reported. The systematic review by Bigham¹⁴⁶ highlighted issues associated with identifying patients suitable for advanced paramedic practitioner intervention and appropriate dispatching at the time of the emergency call as a potential barrier to using these practitioners effectively. As discussed above, training to support decision making has been identified as a facilitator but also a barrier where this is felt to be insufficient. The effects of integration with the wider urgent and emergency care system on successful implementation have also been raised and in particular the need to have

clear information about patients and about access to alternative care pathways for patients.^{150, 174, 176} Other relevant issues identified which impede patient management out of hospital include conflicting demands of maintaining operational performance to meet response time targets which reduces opportunities for training, barriers between professional groups, a continuing perception that the ambulance service is still primarily a transport service and fear of litigation associated with complex decision making.^{174, 176}

Quality

Although there is a substantial evidence base associated with the development of the ambulance service as a provider of out of hospital care, as evidenced by the 7 systematic reviews included in this rapid review, there is a lack of robust, high quality randomised controlled trials. Much of the relevant evidence included in the systematic reviews is derived from the two UK studies comprising a cluster randomised trial of paramedic practitioners¹⁶⁵ and a community intervention trial of ECPs (Mason 2012).¹⁶⁸ There is also a single randomised trial of use of Clinical Decision Support Software for management of fallers.¹⁸¹ The rest of the evidence is based in a range of study designs which introduce a number of limitations identified by study authors including:

- Use of small convenience samples in some studies which introduce potential bias from self-selection of participants and may not be representative of the intended clinician group
- Use of service evaluation approaches with no control group and therefore reported results do not account for any potential bias or confounding effects
- Studies of decision making where clinicians have recorded intended rather than actual decisions (i.e. patients have still been transported to hospital) which limits applicability to actual clinical practice. Compliance rate in completing questionnaires is often low.
- Important outcomes such as adverse events and subsequent health care utilisation are, with a small number of exceptions, not recorded or reported.

More generally, most studies have been small scale, in single sites and usually involved a sub population of patients and clinicians limiting generalisability to wider clinical practice.

Conclusions

Extended paramedic roles have been implemented in various health systems and settings and, based on a small number of high quality studies appear to be successful at reducing transports to hospital, making safe decisions about the need for transport, delivering acceptable care out of hospital and are potentially cost-effective. The evidence on safety of decision making about need for transport to hospital in the broader paramedic workforce without advanced skills is less clear and questions remain about safety. Studies concerned only with decisions about whether or not to transport to hospital also tend to ignore the important issue that a decision not to transport requires good clinical care to be provided at scene as an alternative. Good quality care out of hospital is about more than just the decision to transport.

The authors of the 7 systematic reviews and 12 individual papers included in this rapid review have made a range of recommendations for further research including:

- Further work on the safety of decision making and development of better guidelines, decision support systems (including CCDS) and training to support decision-making
- Further assessment of the risk of under-triage associated with decision support tools
- Barriers to implementation
- Cost-effectiveness of investment in training and potential cost savings across different settings and patient groups
- Further development and exploration of out of hospital care pathways for a range of conditions to support decision-making as effectiveness of initiatives to reduce transport to ED will depend on availability of alternative pathways and services
- Assessment of the impact of prehospital interventions on ED crowding

These areas warranting further research have direct application to the NHS England review and expectations of an enhanced role for the ambulance service in managing more patients with urgent health problems in the community setting. It could be argued that at least some of these areas, for example resolving issues around safety and cost-effectiveness and wider system impact, are pre-cursors to any widespread adoption of increased out of hospital management of patients by ambulance clinicians. However, pragmatically it is the case that ambulance services in England have been progressively reducing the proportion of patients

they transport to ED over a number of years both through managing more patients at the time of their call (hear and treat – discussed more fully in chapter 4) and outside hospital (see and treat). Currently the mean non-conveyance rate to ED is 37% although this varies between individual ambulance trusts from 22% to 5% [NHS England Ambulance Quality Indicators <http://www.england.nhs.uk/statistics/statistical-work-areas/ambulance-quality-indicators/ambulance-quality-indicators-data-2014-15/>]

The reasons for this variation are unclear and the HS&DR research programme has already funded research to explore the reasons for this variation (<http://www.nets.nihr.ac.uk/projects/hsdr/135475>). However, this does illustrate that the ambulance service already manage a substantial number of their calls outside hospital. Given this and the clear important strategic role of the ambulance service in the NHS England review implementation plans,⁸ the future questions relevant to the continued development of the ambulance service as an out of hospital care provider are not about if they should be providing this service but how they can continue to expand and improve this aspect of service delivery. There are 4 key evidence gaps that could be addressed to support this process:

- Clearly a key component to achievement of the NHS England plans is development of the paramedic workforce. The available evidence has shown the potential of advanced paramedic practitioners but these have been relatively small scale and likely to have involved highly motivated individuals willing to advance their practice. There is no evidence about the implications of developing the paramedic workforce at scale to achieve national objectives. One of the issues highlighted in the existing evidence is the possible “gap” in decision making skills between paramedics and paramedics with advanced skills. The paramedic workforce is changing with a much clearer professional framework¹⁸⁹ and is rapidly moving towards a graduate based profession¹⁹⁴ but at present it is unknown to what extent this change may reduce this gap. There is a pressing need to begin to investigate the necessary skill-mix of the paramedic workforce and the proportions of paramedics and paramedics with advanced and specialist skills needed to provide a safe and high quality community based service for patients. The implications around the educational and training needs of the paramedic workforce that will be needed to fulfil this enhanced role, at scale, will need to be considered at the same time.
- More broadly and to support paramedic workforce planning some clarity is needed about volume of activity and specifically the proportion of patients who could be

managed outside hospital. Although the NHS England review has a clear view that ambulance services can manage more patients out of hospital it stops short of stating how many patients this might encompass. As stated earlier, we already know that there is substantial variation in the non-conveyance rate to hospital across ambulance trusts in England and it is reasonable to assume there is scope for services with low non-conveyance rates to move towards comparable performance of services with higher rates of non-conveyance. What is uncertain is whether there is a threshold for non-conveyance beyond which the risks of leaving people at home begin to outweigh the benefits.

- The qualitative research studies that have explored in more depth the barriers and facilitators to developing management of patients in the community have highlighted the need to develop robust clinical care and referral pathways for a range of different conditions as alternatives to transport to hospital. Without these pathways, and confidence that onward referrals will be actioned¹⁷⁶ efforts to manage more people at home will be thwarted. Development of pathways is linked to development of robust guidelines and tools to support clinical decision making at scene. This will require wider system collaboration rather than small scale individual local initiatives. It may be the case that not all patients who can be left at home need an advanced practitioner if they can be referred to an appropriate alternative provider. The existing evidence suggests that there is potential for clinical decision support software and triage tools (such as Paramedic Pathfinder) to improve and support decision making and further research in this area is needed but this will need to be aligned to workforce development as graduate paramedics with higher level skills may circumvent the need for this type of triage tool. However, it is likely that as the range of alternatives increases so the need for decision support tools increases.
- The existing research evidence is based in small studies which, although showing local effects on reducing transports to ED have not been at sufficient scale to assess system impacts across a range of services both in terms of activity and associated costs. Expanded care by ambulance services in community settings may reduce ED attendances and hospital admissions but increase contacts with primary care, community and social services. Ambulance services themselves may need additional resources (staff, vehicles and equipment) and have increased training costs to support this expansion of their service. Future evaluation of initiatives to develop paramedic

practice and increase the number of patients managed in community settings needs to assess the impact of these initiatives at scale and at a whole system rather than individual service level.

Chapter 6 - Delivery of Emergency department services

Introduction

The NHS England review ⁶ has a focus on managing more urgent conditions outside acute hospitals including, for example, urgent care centres. It also recognises the need to provide higher level care for some healthcare problems and sets out a strategy for emergency care that can deliver treatment in the right type of facilities and maximise patient outcomes. The model envisaged includes two types of facility, Major Emergency Centres with highly specialised services and Emergency Centres that can treat most emergency conditions and, where appropriate, refer on to a Major Emergency Centre. A core principle for both centres is the presence of senior clinicians 7 days a week. This “model” has been interpreted to some extent as creating a 2 tier service but in reality reflects current provision and the NHS England states it expects the number of centres to remain broadly the same as the current number of Emergency Departments.

Reviewing the evidence on delivery of emergency department (ED) services poses significant challenges. Unlike the preceding two reviews which had a focussed, well defined method (telephone triage) or aspect (paramedic management of patients out of hospital) of service delivery, provision of ED care encompasses the much broader set of issues associated with whole service delivery. These include organisation and operations, service dynamics (flow), clinical roles of different professional groups, demand, clinical complexity of a heterogeneous population of users and relationships with other parts of the health service. Consequently there is also a vast evidence base of related research.

The commissioning brief for these reviews has a focus on models of delivery. We have not reviewed the evidence on highly specialised and regionalised care (acute cardiac care, stroke, major trauma) as these have been extensively reviewed elsewhere.¹⁹⁵ Instead we have focused this review on the evidence around the organisation and operations associated with delivery of general ED services (which are also provided in Major Centres). The Royal College of Emergency Medicine produced a report in 2014 which identified 13 recommendations for changes needed to build a sustainable and resilient emergency and urgent care system ⁹. We used some of these recommendations, specifically about delivery of ED care (rather than whole system issues) to further refine the focus. We have therefore conducted two linked but separate rapid reviews.

- 1) A key recommendation is that every ED should have a co-located primary care out-of-hours facility. We have updated an existing related rapid evidence review published conducted in 2010 to assess the current evidence for this model of care
- 2) We have also reviewed the broader evidence on ED organisation and operation and on advice from a senior clinician kept the emphasis on ED flow (including front door assessment and back door discharge), the related area of clinician role and the key growing area of managing the complex elderly patients in ED.

Co-location of primary care and ED

Methods

For this review we replicated and updated the search strategy used in a previous rapid review¹⁰ and this is described in detail in chapter 2. Searches were conducted for the years 2009-14. We also applied the same inclusion criteria used in this review.

Inclusion criteria:

- Studies reporting primary data on interventions for managing patients with primary care type conditions, however defined
- Included objective measures attributable to a defined intervention, either within or allied to the emergency department.

Review process

Studies were identified from the updated database search and were supplemented by using the reference list of studies identified and included in a related systematic review recently conducted and in preparation for publication by authors within ScHARR [Shammi et al, personal communication]. This paper identified 4 additional studies and these were assessed for inclusion in this review. A randomly generated 10% sample of studies from the database searches (n=572) was double sifted by another member of the study team. The reviewers initially agreed on inclusion or exclusion for 96.4% of studies and agreed to exclude the remaining 26 studies after discussion.

Results

Nine papers were included in the review, 2 systematic reviews which included 28 individual papers and 7 additional papers.

The results of the review sifting process are given in Figure 5.

A summary of the characteristics and findings of the included papers are given in tables 16 & 17.

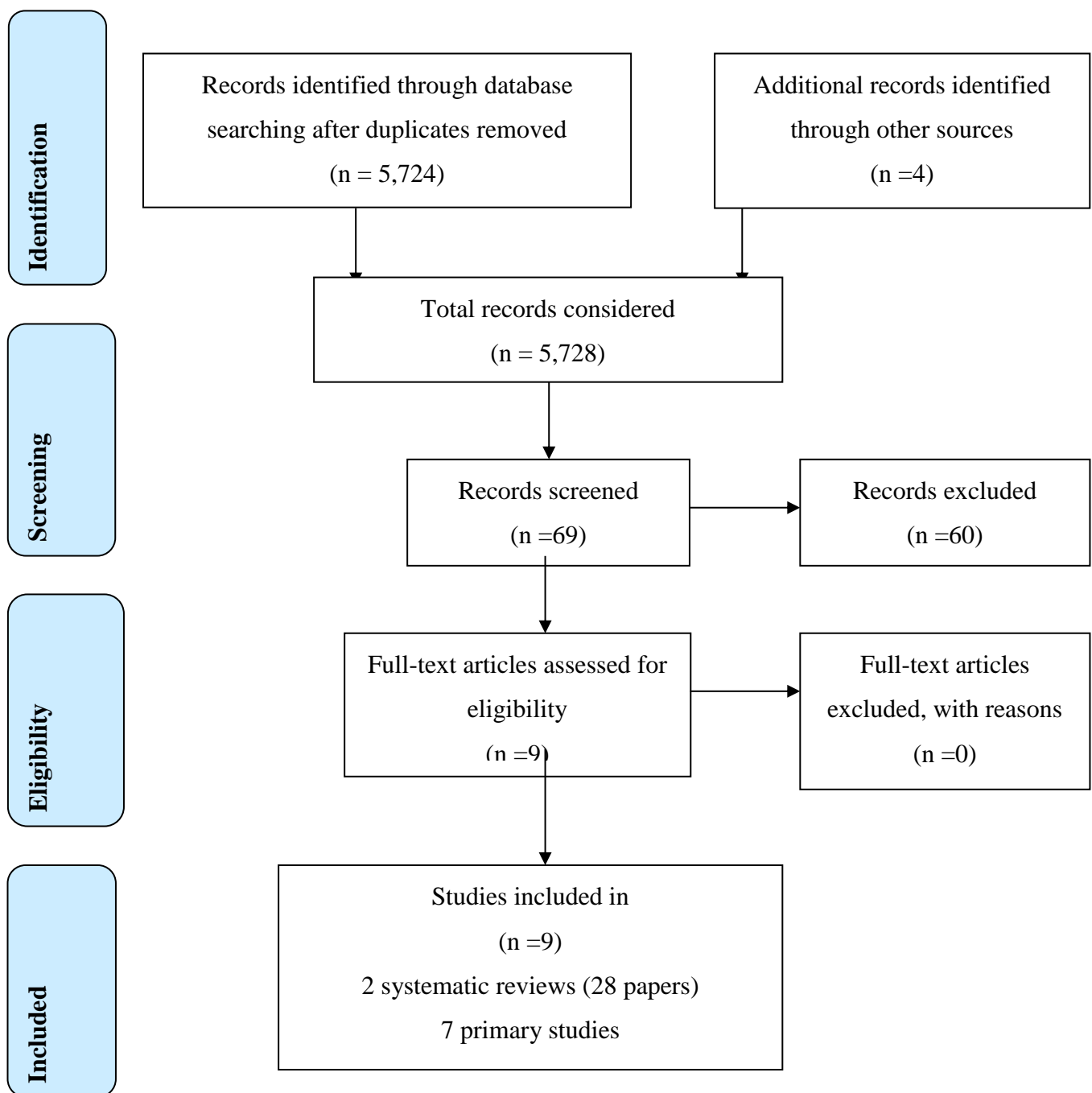


Figure 5 PRISMA flow diagram for management of primary care in ED searches

Table 16 Summary of systematic reviews on management of primary care conditions in ED

Author, Year	Study Design	Population & Setting	Purpose	Main Findings
Fisher, 2010 ¹⁰	Rapid review of the literature and narrative analysis.	<p>Patients of all ages seeking primary care attending a service:</p> <ul style="list-style-type: none"> • Integrated within an ED • Co-located with an ED • Located within the grounds of the hospital • Located within close proximity to a hospital. 	<p>Assessment of evidence on interventions for managing patients with primary care type conditions, either within or allied to the emergency department.</p> <p>Outcomes included: attendance at primary care; attendance and/or re-attendance at ED; adverse events; patient satisfaction; investigations & referrals requested; prescriptions issued.</p>	<p>28 studies included. A GP working in the ED may result in less referrals for admission and less tests being undertaken. Cost benefits may exist but the evidence is weak.</p> <p>Redirect away from ED has variable results in predicting future attendances. Assessments of safety of this intervention have variable results. Primary care appointments made for patients redirected from the ED may not be kept. Educational interventions do not show change in attendance patterns.</p> <p>There is a paucity of evidence available to support the current system.</p>
Khangur a 2012 ¹⁹⁶	Systematic literature review	Patients who present to hospital EDs with illness or injury conditions suitable for primary care.	Effect of primary care professionals working in hospital EDs (including GPs, nurse practitioners, optometrists and dentists) on admissions; length of stay; resource	3 studies included. Two reported GPs used significantly fewer healthcare resources than Emergency Physicians (EPs), with fewer blood tests, X-rays, admissions to hospital and referrals to specialists. One study reported no

			<p>use; costs; follow up care and health care utilisation and adverse events.</p>	<p>difference in number of prescriptions made by GPs compared with Emergency Physicians and one that GPs prescribed significantly more than EPs. These two studies showed marginal cost savings from introducing GPs in hospital EDs. Third study failed to identify a significant difference in the number of investigations or admissions to hospital but a significantly greater number of referrals to specialists and prescriptions made by GPs compared with EPs. Insufficient evidence to draw conclusions about the effectiveness and safety of GP versus EPs for non-urgent patients in the ED.</p>
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Table 17 Summary of individual studies on management of primary care conditions in ED

Author, Year, Country	Study Design	Population & Setting	Purpose	Main Findings
Boeke, 2010 ¹⁹⁷ Netherlands	Before and after comparative study of a new care method in the ED of an Amsterdam university medical centre.	Adult patients who self-presented to ED on weekdays during the day (10.00–17.00 hours).	Evaluation of impact of introducing GP services in to ED to manage primary care conditions on: Patient satisfaction; Time from arrival to departure; Time from start of consultation to departure; Referrals for aftercare.	Patient satisfaction with the treatment increased significantly. The mean process time decreased from 93 to 69 minutes (P<0.001). The mean treatment time decreased from 60 to 35 minutes (P<0.001).
Bosmans, 2012 ¹⁹⁸ Netherlands	Before and after design	Self-referrers who attended the ED on weekdays during the day (10:00 -17:00 hours).	Evaluation of adding a GP to the ED to manage primary care problems to Patient satisfaction; process time; costs	Significantly reduced process time, significantly higher patient satisfaction and no statistically significant difference in the number of correct diagnoses after intervention introduced. Total costs per patient were €217 in new service compared to €288 before (mean difference -€71, 95% CI -121 to -23).
Enard & Ganelin, 2013 ¹⁹⁹	A non-equivalent comparison group, quasi-	Patients older than 18 months and younger than 65 years who frequently	Impact of a primary care patient navigation referral programme on primary care related emergency	Patient navigation intervention was associated with decreased odds of returning to the ED in less frequent PCR-ED users. For patients who

USA	experimental study design.	use the ED for primary care and are publicly insured.	department (PCR-ED) attendance and cost per person of a PCR-ED visit.	returned to the ED for PCR reasons, the pre/post mean visits declined significantly over a 12-months but not 24-months. Savings associated with reduced PCR-ED visits were greater than the cost to implement the navigation programme.
Salisbury, 2007 ²⁰⁰ UK	A controlled before and after study.	Patients consulted, admitted or discharged monthly from 6 months before the opening of walk-in centres to 6 months after.	Evaluation of the impact of opening walk-in centres located with EDs on attendance rates; Duration of visits; Costs; Outcome of care	At most sites, the walk-in centres did not have a distinct identity and there were few differences in the way services were provided compared with control sites. Overall, no evidence of an increase in attendance at sites with walk-in centres, but considerable variability across sites. Proportion of patients managed within the four hour target improved at intervention and control sites. No evidence of any difference in re-consultation rates, costs of care or patient outcomes at sites with or without walk-in centres.
Sharma & Inder 2011 ²⁰¹	Observational study of ED waiting times	Emergency (category 2) and non-urgent (category 5) patients in 38 hospital	Analysis of differences in patient waiting times (difference between arrival time and time first seen by	The degree of choice for non-urgent patients has a non-linear effect: more choice for non-urgent patients is associated with longer waits

Australia	over 1 year in the State of Victoria	ED's.	treating doctor) at ED's with and without co-located GP services.	for emergency patients at lower values and shorter waits at higher values of degree of choice. Increasing choice of ED for non-urgent patients related to longer wait for emergency patients in EDs. Waiting time for emergency patients in hospitals with co-located GP clinics was 19% (mean 1.5 min) less than in hospitals without co-located GP clinics.
Thijssen, 2013 ²⁰² Netherlands	Longitudinal observational study three years before and three years after the start of an emergency care access point (ECAP)	All attendances at ED and GP co-operatives over the 6 year period 2006-12	Evaluation of the impact of introducing an integrated after-hours care model on ED and GP co-operative self-referrals; non-self-referrals and follow-up contacts.	ED attendances decreased by 13% after the start of the ECAP (59,182 before v 51,513 after). Self-referred ED patients decreased 99.5% (OR 0.003; 95% CI 0.002–0.004). Referred patients increased by 213.4% and ED hospital admissions increased by 20.2%. Planned outpatient follow-up increased by 5.8% (OR 1.968 95% CI 1.870–2.071). Regional general practitioner co-operative consultations increased by 26.0% (183,782 versus 232,246).
Wang, 2014 ²⁰³	Before and after study	Consecutive patients attending ED with	Evaluation of the effects of implementing of a new Hospital	Median time from admission to discharge was 120 minutes in the ED [IQR: 80–165] versus

USA		ambulatory care conditions from 1 October 2007 to 12 November 2007 before intervention (n= 451) and routed to HGP from 6 April 2010 to 14 May 2010 post intervention (n=342).	Integrated General Practice (HGP) service on time from admission to discharge and time intervals between different stages of care.	60 minutes in the HGP (IQR: 40–90) ($P < 0.001$). The adjusted odds ratio of receiving any additional diagnostics was 1.86 (95% confidence interval 1.06–3.27; $P = 0.032$) for ED doctors versus GPs controlled for age, sex and injury-related medical problems.
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The characteristics of primary studies included in the two systematic reviews and the 7 additional studies are described in Table 18.

Table 18 **Characteristics of studies on Primary care in the ED**

N = 35 studies	
Country	
USA	14 (40%)
UK	6 (17%)
Other Europe	14 (40%)
Other	1 (3%)
Study design	
Before and after study	21 (60%)
Randomised control trial	5 (14%)
Prospective	3 (9%)
Observational study	4 (11%)
Systematic review	1 (3%)
Retrospective audit	1 (3%)
Patients	
Adults and children	11 (31%)
Children	7 (20%)
All	12 (34%)
Adults	5 (14%)
Setting	
Co-located	10 (29%)
Not co-located	25 (71%)

Summary of findings

Two systematic reviews^{10,196} examining the evidence on effectiveness of primary care services associated with ED included findings from 28 studies. Both concluded that, although there was some evidence that locating primary care services within or close to ED could

reduce ED attendances, might save resources by using fewer diagnostics and referrals for admission and potentially could reduce costs, the evidence base to support development of this model of care was weak and based on poor quality studies. Our search identified a further seven, more recent studies which, overall presented more positive findings on the potential benefits of integrating GPs within ED. Two studies in the Netherlands where GPs were located within the ED^{197, 198} found process and treatment times were reduced and patient satisfaction increased after the introduction of this service and that there were cost savings. However these were both uncontrolled before & after studies so the influence of other potential confounding factors is unknown. A study of a primary care patient navigation service significantly reduced the likelihood of ED readmission for less frequent primary care-related ED users¹⁹⁹ and produced cost savings whilst a Hospital-integrated general practice (HIGP) service was shown to have potential to significantly reduce the time from admission to discharge and resource use as primary care doctors used fewer diagnostics than ED physicians.²⁰³ A broader study examined longitudinal trends in ED attendances over 3 years after introducing integrated out of hours GP co-operatives.²⁰² Findings were that overall ED attendances decreased and in particular self-referrals, but referrals from GPs to ED increased as did ED admissions. Unsurprisingly, GP co-operative consultations increased and what is unclear is the net effect of patient movement between these services. Again all of these studies were uncontrolled. The only comparative trial was conducted in the UK and investigated the impact of introducing walk in centres in the vicinity of EDs.²⁰⁰ This study found that whilst ED attendances decreased in some centres in others there was no change. Overall, there was no evidence of impact on re-consultations, patient outcomes or costs. The lack of success may in part have been due to the walk in centres not having any clear identity and hence were not visible to the public as an alternative to ED. Of the available evidence the most convincing seems to be from models where GPs or primary care professionals are located within the ED itself rather than alongside or as stand-alone units. Intuitively this makes sense as it creates a single “front door” which may reduce confusion for the public and allow more efficient streaming between ED and primary care with a single entry and assessment point. It is also possible that this intervention may be most suitable for simple single episodes and that complex conditions and frequent users need more specialist and sophisticated care.¹⁹⁹ Boerke¹⁹⁷ makes an important point about the influence of general societal and cultural factors on healthcare-seeking behaviour, and suggests that interventions to reduce the amount of “inappropriate” use are likely to fail and strategy might be better

focused on enhancing adequacy of care, and less on trying to match healthcare-seeking behaviour to the services.

Quality

The quality of the available evidence is generally poor. Of the 35 included studies there were only 5 randomised controlled trials and a high preponderance of uncontrolled before and after studies which cannot control for other system effects. For example, the study by Thijsen²⁰² acknowledges that closure of hospitals during the study period may have had some influence on the findings. The authors of the 2 systematic reviews identified a range of limitations to the studies included in their reviews including small sample sizes in the form of low response rates, lack of data on patient wait-times, length of hospital stay, adverse effects or mortality and a lack of consideration of patient safety issues.¹⁹⁶ The review by Fisher¹⁰ also identified the poor research design and reporting of studies including variability in study design and length, sample size, period of follow-up and definitions of primary care/non-urgent type condition. Individual authors of included studies have acknowledged the difficulties of conducting randomised trials in this difficult environment.¹⁹⁸ The majority of studies were set in single centres which limits generalisability. This is exacerbated if the focus is a particular group, such as the uninsured, the elderly, or children and may also be limited by the healthcare system an intervention operates in.¹⁹⁹ The trial by Salisbury²⁰⁰ identified some additional limitations and important considerations particularly the low quality of available routine data; the need to allow new services time to mature and hence to design studies of sufficient length to detect real effects and the need to conduct studies at scale and assess true impact across a whole system rather than single sites.

ED organisation and operation

Methods

The main general inclusion and exclusion criteria, search strategies and review process described in Chapter 2 have been applied to this review. Searches were conducted for the years 1995-2014. Specific inclusion and exclusion criteria used in this review were:

Inclusion criteria:

- Empirical studies that had evaluated changes to ED service delivery
- Associated with the key areas of ED flow management, workforce specific or management of frail elderly
- Applied to the broad ED population (not specific conditions)

Exclusion criteria:

- Descriptive studies of a service intervention only with no assessment of impact

Review process

Studies were identified from the database search and were supplemented using our internal topic expertise. The searches identified 3539 records. Early in the search sifting process it became clear that, with such a broad range of processes present within ED, the volume of potential inclusions was prohibitive in terms of including and synthesising individual papers or studies. The initial sifting identified a large number of existing, related, systematic reviews and so a decision was made that we would only include these systematic reviews in our synthesis.

Results

22 systematic reviews were included. The results of the review sifting process are given in Figure 6.

A summary of the characteristics and findings of the included systematic reviews are given in tables 19-21.

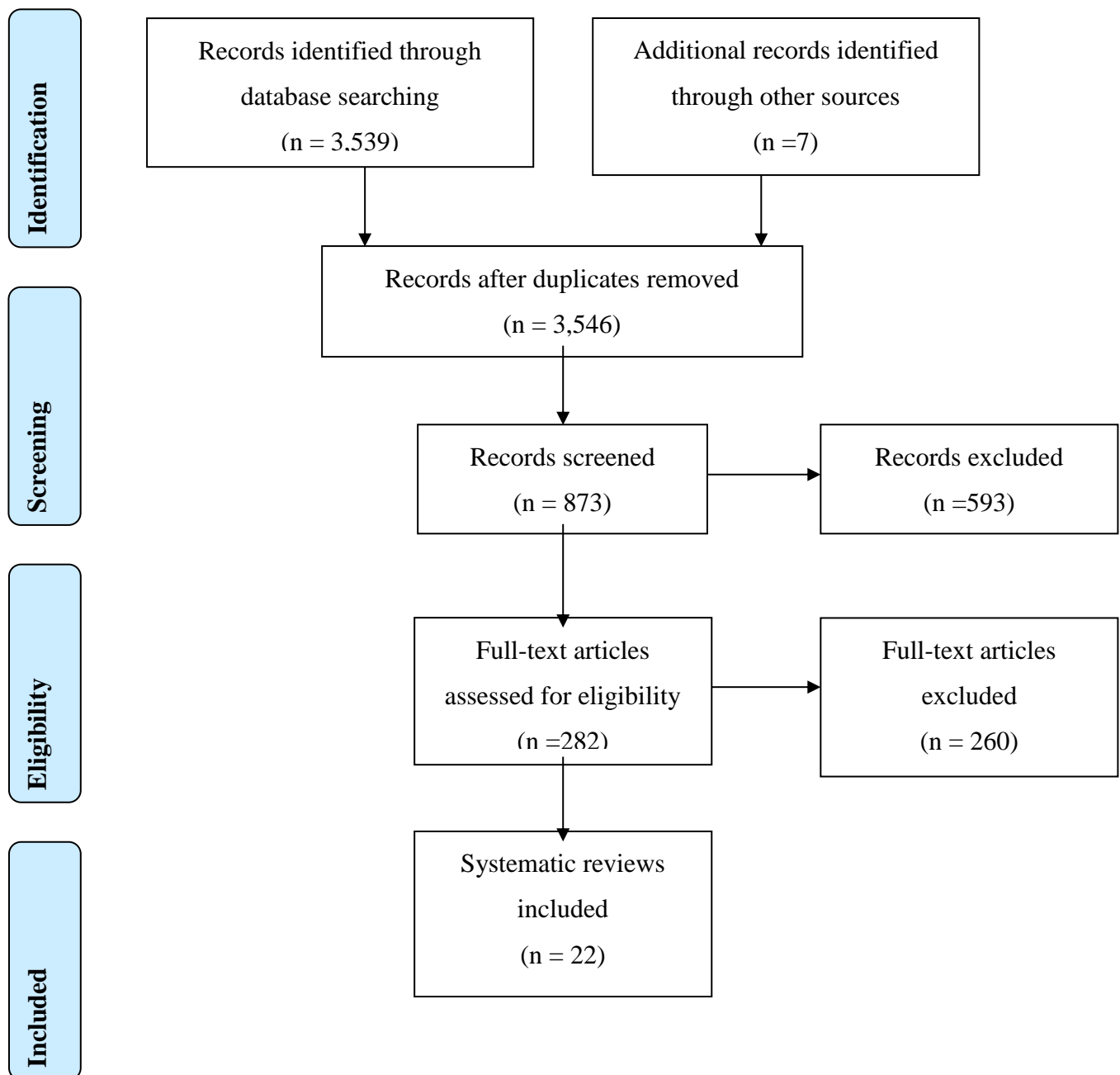


Figure 6 PRISMA flow diagram for delivery of ED services search

Table 19 Summary of systematic reviews on managing ED flow

Author, Year,	Study design	Population & Setting	Purpose	Main Findings
El Abdulwahid 2015 ²⁰⁴	Systematic literature search with assessment of relevance and bias using the Effective Public Health Practice Project (EPHPP) bias tool.	Emergency Department, senior Doctor triage	To review and synthesise studies with the primary aim of investigating the effect of senior doctor triage on emergency department quality indicators (waiting time (WT), length of stay (LOS), left without being seen (LWBS), left without treatment complete (LWTC)	25 studies with a control group were included. Most studies showed that using senior doctor triage improved ED performance measure results. Pooled results from 2/4 RCTs showed a significant reduction in LOS for medium acuity patients (WMD -26.26 min 95%CI -38.50 to -14.01). Two other RCTs showed waiting times significantly reduced when using senior doctor triage (WMD -26 min, 95%CI -31.68 to -20.65). LWBS was reduced in 2 RCTs [RR = 0.79, 95% CI 0.66 to 0.94]. This was similar to most of pre-post study designs. Senior doctor triage had no effect on adverse events or clear benefits for patient satisfaction or cost effectiveness. 9 studies were of moderate quality, 4 were of strong quality and 12 were weak quality.
Bullard, 2012 ²⁰⁵	Narrative synthesis, grouped by outcome	Emergency Department, rapid assessment zones/pds	To synthesise evidence on the use of rapid assessment zones/pods to reduce overcrowding	There were 4 included studies, (1 RCT, 1 controlled trial, 2 before and after studies), with sample sizes between 200 – 12305, representing 23189 participants. Study quality was assessed as weak for 3 of the studies.

Author, Year,	Study design	Population & Setting	Purpose	Main Findings
			in adult EDs	<p>The review reported that rapid assessment zones/pods have the following benefits:</p> <p>Two studies showed a reduction in ED length of stay. This ranged from -20 minutes (95% CI -47.2 to 7.2) to -192 minutes (95% CI -211.6 to -172.4).</p> <p>Three studies showed reductions in physician initial assessment ranging from 8 minutes (95% CI -13.8 to -2.2) to 33 minutes (95% CI -42.3 to -23.6).</p> <p>Two studies showed a reduction in left without being seen, ranging from RR 0.93 (95% CI 0.77 to 1.12) to 0.68 (95% CI 0.63 to 0.73). Low acuity patients found to benefit most from rapid assessment zones, but limited evidence to support implementation.</p>
Cooke, 2003 206	Qualitative systematic review.	Emergency Department; assessment/admission wards	To review the advantages and disadvantages of the use of assessment/admission wards	17 studies included. Most suggest assessment or admission wards are beneficial; they improve patient satisfaction, are safe, reduce length of stay, provide earlier senior involvement and reduce unnecessary/ inappropriate admissions. May be particularly useful for certain diagnostic groups, but have little effect if care is already

Author, Year,	Study design	Population & Setting	Purpose	Main Findings
				good. Observation wards may reduce ED workload and improve patient flow. Reduced pressure on hospital staff allows more time for important decision making such as diagnosis, ensuring appropriate admissions which may reduce costs. Some studies advise patients should be transferred out within 24 hours to prevent inappropriate use.
Daly, 2003 207	Systematic review (comparative studies)	Emergency Department, Short stay observation units (SOU)	To conduct a systematic review of how short-stay observation units (SOU) affect the efficiency of healthcare delivery and the quality of services provided.	Reported potential benefits of SOUs are reduced length of stay, improved ED efficiency & reduced cost but between study variation in reported benefits. Length of stay (LOS): One study reported reduced LOS for patients treated with a “rapid” chest pain protocol in a chest pain unit to exclude the diagnosis of myocardial ischaemia. Average LOS for “rapid” protocol patients was 15.4+-12.2 hours, compared to 54.6+-12.6 hours for routine care. Re-contacts: Two papers examined the impact of SOUs on ED re-contacts for patients with asthma. In one study repeat ED visits within 72 hours increased from 3% to 5% after the introduction of an observation unit for asthma patients. The other reported no difference.

Author, Year,	Study design	Population & Setting	Purpose	Main Findings
				Cost: A cost comparison showed observation unit management for asthma patients over 7 days was significantly lower (mean, \$1,203+-\$1,344) than those admitted to inpatient care (mean, \$2,247+-\$1,110). Costs were higher than standard care for patients who subsequently hospitalised.
Flores-Mateo, 2012 208	Systematic review (n=48)	Emergency department	To systematically review the effectiveness of organisational interventions designed to reduce ED utilisation	Most studies were of poor methodological quality. Results were reported in the following categories: 1) Interventions addressing the supply and accessibility of services (n = 25): 10 studies demonstrated lower ED visits are associated with increased amounts of primary care centres or doctors. Of 3 studies concerned with hospital admission, 2 reported a decrease and one reported no change. 2/ 9 studies reported less ED use after increasing OOH provision, but results for other studies reported less consistent results and some increase in use. Analysis of all studies showed that ED use is only reduced if primary care is provided by the same team. 2) Service demand interventions:

Author, Year,	Study design	Population & Setting	Purpose	Main Findings
				<p>Educational interventions n= 6. Two RCTs found no differences in post intervention ED use. Others reported specific interventions associated with lower ED use were monthly educational group meetings; health education; patient advice; counselling; use of care facilitators. Two studies found a significant reduction in the number of hospital admissions for the intervention groups.</p> <p>Barrier interventions (gatekeeping/cost) n = 17). 7 out of 8 studies reported ED cost-sharing reduces ED utilization and the other reported a dose-response relationship between co-payment and ED visits reduction. No increases in hospitalizations or mortality rates were reported.</p> <p>Overall, evidence suggests ED cost sharing and interventions to increase access to primary care are successful at reducing ED visits. Other interventions had variable results.</p>
Georgiou, 2013 ²⁰⁹	Systematic review of quantitative studies	Emergency Department,	A systematic review of the quantitative	22 studies met the inclusion criteria. CPOE was associated with an increase in time spent on computers (up to 16.2%

Author, Year,	Study design	Population & Setting	Purpose	Main Findings
		computerised physician order entry (CPOE) systems. ED settings or ED outcomes	literature related to the effect of computerised provider order entry systems in the emergency department (ED).	for nurses and 11.3% for physicians), but with no significant change in time spent on patient care. CPOE with decision support systems showed significant decreases in prescribing errors (ranging from 17 to 201 errors per 100 orders), potential adverse drug events (0.9 per 100 orders), and prescribing of excessive dosages (31% decrease for a targeted set of renal disease medications). High possibility of publication bias towards studies with positive results.
Harding, 2011 ²¹⁰	Systematic review, no study design restrictions. Data were analysed using descriptive synthesis	Emergency Department; triage systems	What effect do different triage systems have on patient flow?	<p>The authors identified that triage systems may improve quality of patient care across multiple settings through reduced waiting time, shorter waiting lists and reduced length of stay. Some evidence that services providing triage and initial treatment have a positive effect on patient flow but conflicting evidence on patient flow for systems providing triage without initial treatment.</p> <p>8 studies conducted in hospital EDs with a doctor at the triage desk in conjunction with standard nurse triage found some evidence of benefit for reducing length of stay; number of patients who left without being seen and ED</p>

Author, Year,	Study design	Population & Setting	Purpose	Main Findings
				<p>waiting time.</p> <p>Three studies evaluated use of a multidisciplinary triage clinic and found over 20% of patients were discharged at triage and waiting times were reduced.</p> <p>Half of the included studies were considered poor quality.</p>
Holden, 2011 211	Critical review		To critically review 18 articles describing the implementation of Lean in 15 EDs in the United States, Australia, and Canada	<p>Lean is a process improvement approach designed to eliminate waste. Within ED this relates to patient flow and over triage/unnecessary investigations. Patient care usually improved after implementation of Lean, with many EDs reporting decreases in length of stay, waiting times, and proportion of patients leaving the ED without being seen. Few null or negative patient care effects were reported, and studies typically did not report patient quality or safety outcomes beyond patient satisfaction. The effects of Lean on employees were rarely discussed or measured systematically, but there were some indications of positive effects on employees and organisational culture. Success factors included employee involvement, management support, and preparedness for change.</p>

Author, Year,	Study design	Population & Setting	Purpose	Main Findings
Hoot & Aronsky, 2014 ²¹²	PubMed search and synthesis	General Emergency Department	To identify and report on articles that studies causes, effects or solutions of ED crowding	Causes of crowding were: non-urgent visits; frequent attenders; influenza season; inadequate staffing; inpatient boarding; and hospital bed shortages. Effects of crowding included: increased patient mortality; transport delays; treatment delays; ambulance diversion; patient elopement; and financial effect. Solutions of crowding included: additional personnel; observation units; hospital bed access; non-urgent referrals; ambulance diversion; destination control; crowding measures; and queuing theory.
Katz, 2012 ²¹³	Systematic review	Emergency Department and post ED treatment plans: urban; rural; multicentre; single centre;	A systematic review on the effectiveness of emergency department (ED)–based care coordination interventions.	Of 23 included articles, 14 were RCTs and 9 were quasi-experimental studies. The many different types and settings of EDs made it difficult to compare results. Most care coordination interventions have been implemented in single centre EDs, with good results. Two thirds of studies described interventions that were effective in improving their primary outcome. 19 studies developed post-ED plans and 12 were effective in improving follow-up rates or reducing repeated ED visits. However 4 studies found

Author, Year,	Study design	Population & Setting	Purpose	Main Findings
				higher ED visit rates. Of 4 studies that used educational services for continuing care, 2 were effective. From 2 studies evaluating information transfer, 1 was effective.
Lee 2008 ²¹⁴	Systematic review; acute ED presentations	Emergency Department	This review systematically evaluated the literature on ED consultations with other specialities.	12 studies included, with little new research published since the mid-1990s. 11/12 studies were from the US or Canada so may not reflect EDs in other countries. Overall, 4 studies examined ED consultation proportions, 6 identified the rate of consultation for special populations of ED presentations and 2 examined interventions to improve consultations. Only two published studies on interventions to reduce or control ED consultations. Consultation rates varied from 20% to 40% for all patients, usually reported for patient sub-groups and varied by setting. Limited research on how to improve the ED consultation process and the relationship with overcrowding.
Paul, 2010 ²¹⁵	Systematic review	Emergency Department; overcrowding	The aim of this systematic review was to highlight the	Most studies aimed to identify potential improvements in costs and competition, efficiency, re-engineering, and quality of service.

Author, Year,	Study design	Population & Setting	Purpose	Main Findings
			contributions of simulation studies to our understanding of ED overcrowding and to explore how simulation can be better used as a tool to address crowding	<p>Studies examined resource related, process related and environment related scenarios.</p> <p>Resource related scenarios found 1) increased ED bed capacity did not reduce waiting times or length of stay just shifted delays. 2) holding areas for patients waiting for beds found positive results in terms of minutes saved per patient. 3) staff - nurse scheduling does not significantly impact on waiting times. Few studies looked at configuration of resources and equipment and most found there was no optimal solution. One study found installing laboratory and x-ray facilities in ED was equivalent to an additional nurse and doctor.</p> <p>Process related scenarios to reduce ED crowding showed introducing a fast track path for low urgency patients was effective at reducing waiting times without compromising care quality. Changes to triage protocols was also associated with time saved.</p> <p>Environment related scenarios focused on external causes</p>

Author, Year,	Study design	Population & Setting	Purpose	Main Findings
				of overcrowding, such as unavailable inpatient beds. Studies found that increasing the number of hospital beds to which ED patients can reduce ED stay and costs. Whilst simulation is useful for identifying areas for improvement, practical use is limited.
Porter, 2014 216	Systematic review. Evaluation of innovation without comparator, or comparison of innovation with usual care.	Emergency Department; Adult patients; clinician-led rapid assessment teams (RAT) to streamline patient handover and flow in the ED.	The systematic review was undertaken to identify rapid assessment models used to expedite patient care and treatment in EDs and evidence about their effects.	Studies reported that rapid assessment models reduced waiting time, length of stay and numbers of patients who left without being seen. Interventions tended to benefit all patients in the ED not just target conditions as reducing time in ED for low acuity patients freed resources for patients with more urgent needs. Staff and patients reported positive reactions. Methodological and reporting quality of papers was mostly moderate or weak, so evidence about the effect of these interventions should be treated with caution.
Roberts & Mays, 1998 217	Systematic review	Emergency Department; patients with minor illness or injury	To assess the extent to which primary secondary substitution is possible in emergency care.	34 studies of a range of interventions were included. Variable methodological quality. Demand for ED may be reduced by increasing access to primary care or introducing barriers to ED care (e.g. charges), but cost effectiveness of these approaches are unknown. Alternative more cost

Author, Year,	Study design	Population & Setting	Purpose	Main Findings
				<p>effective approach is to use primary care professionals within ED to treat patients with non-urgent At the time of the review there was little evidence on impact and cost-effectiveness of telephone triage, minor injuries units and GP out of hours cooperatives.</p> <p>The results showed no evidence of any significant differences in patient satisfaction or health outcomes between GP and hospital doctor management patients and suggest that restricted hospital access carries low levels of risk and was acceptable to patients</p>
Leydon, 1998 (From Egleston, 1998) ²¹⁸	Systematic review	Emergency Department; patients with minor illness or injury	A systematic review of the literature on the cost-effectiveness of alternative models of A&E care for the primary care attender	<p>17 papers were included, 12 from the USA. There was variation in study inclusion criteria, sample size, study length and the definition of a primary care patient. The studies considered different interventions so no conclusions could be drawn on the most cost-effective model of service provision. Summary of the evidence:</p> <p>Interventions that divert patients from ED to primary care may be effective not always reduce the number of patients with primary care complaints attending ED.</p>

Author, Year,	Study design	Population & Setting	Purpose	Main Findings
				<p>Primary care provision within ED may increase patient satisfaction, particularly if waiting times are reduced.</p> <p>The introduction of a co-payment scheme reduced primary care ED attendances by 14.6%</p> <p>Patient education by itself does not produce a measurable reduction in primary care ED attendances.</p> <p>The unit cost of treating a primary care patient in ED is similar to treating that patient in primary care & providing GPs within ED could potentially reduce costs.</p>
Rowe, 2011 219	Systematic review	Emergency Departments; Adult only (>17) or mixed (i.e., child and adult) populations.	A systematic review to examine the effectiveness of triage liaison physicians (TLPs) on mitigating the effects of emergency department (ED) overcrowding.	<p>28 studies were included - 13 journal publications; 12 abstracts; 3 Web-based articles. Most studies employed before–after designs; 23 of the 28 studies were considered of weak quality. Pooling of data from two randomised controlled trials (RCTs) found TLPs resulted in shorter ED Length of stay (LOS) compared to nurse-led triage (Weighted Mean Difference WMD = -36.85 min; 95% CI = -51.11 to -22.58). One RCTs showed a significant reduction in the time to physician assessment associated to TLP presence (WMD = -30.00 min; 95% CI = -56.91 to –</p>

Author, Year,	Study design	Population & Setting	Purpose	Main Findings
				3.09); the other RCT showed no change in leaving without being seen rates (RR = 0.82; 95% CI = 0.67 to 1.00).
Rowe, 2011 220	Systematic review	Emergency Department; Adult only (>17) or mixed (i.e., child and adult) populations.	A systematic review to examine the effectiveness of triage nurse ordering (TNO) on emergency department (ED) overcrowding - ED Length of Stay (LOS), time to physician initial assessment (PIA)	14, mostly single centre ED studies included. Most studies had methodological issues. The evidence showed TNO appeared effective at reducing ED LOS, particularly for cases of injury or possible fractures. For injured patients with suspected fracture, 3 RCTs indicated TNO interventions produced a significant reduction in ED LOS (pooled mean difference = -19.7 minutes; 95% CI = -37.5 to -1.9 minutes) but result has high heterogeneity (I ² = 92%). TNO interventions comparing emergency physician (EP) and emergency nurse practitioner (ENP) x-ray ordering found a significant reduction in ED LOS (mean difference = -37.2 minutes; 95% CI = -44.1 to -30.3 minutes).

Table 20 Summary of systematic reviews on ED workforce

Author, Year,	Study design	Population & Setting	Purpose	Main Findings
Carter & Chochinov, 2007 ²²¹	Systematic review (MEDLINE and Cinahl).	Emergency Department; Nurse Practitioners	To assess the use of Nurse Practitioners in the ED setting in relation to waiting times; patient satisfaction; quality of care and cost effectiveness.	<p>Quality of care: Doctors and NPs were equally competent and accuracy was associated with experience regardless of profession.</p> <p>Patient satisfaction: Consistently high for both NPs and physicians, but often higher for NPs. NPs explained procedures better than physicians (14.3% for NPs, 6.1% for residents).</p> <p>Waiting times: Introducing a NP in a minor injury unit, ED or free standing unit associated with reduced waiting times.</p> <p>Cost effectiveness: Costs of NPs are higher when compared with resident physician costs but no data comparing the cost of NPs with hiring additional medical professionals.</p>
Wilson, 2009 ²²²	Systematic review	Emergency Department. Patients > 16 with minor injuries.	A systematic review to determine the clinical effectiveness of ED	<p>Nine studies included in the review: 5 experimental studies and 4 descriptive surveys.</p> <p>No significant differences in terms of significant errors in care or number of patients followed up for emergency nurse practitioners compared with junior doctors or standard care</p>

Author, Year,	Study design	Population & Setting	Purpose	Main Findings
			nurse practitioners in assessment, treatment and management of minor injuries	(two RCTs, n=1,652). There was no evidence of statistical heterogeneity for these analyses. The review findings support the use of nurse practitioners for management and treatment of minor injuries in adults, but more high quality studies are needed.
Doan, 2011 223	Systematic review		To describe the role and impact of physician assistants (PAs) in the ED	66 studies, mainly of limited methodological quality, were included. More academic medical centres report using PAs in ED (65-68% vs 13-18%). Most of the evidence shows that PAs are able to assess some medical complaints and performing procedures, and are accepted by both ED staff and patients. Evidence is limited as to whether PAs improve ED flow or are cost-effective.

Table 21 Summary of systematic reviews on management of frail elderly in ED

Author, Year,	Study design	Population & Setting	Purpose	Main Findings
Conroy, 2011 ²²⁴	Systematic review of RCTs	Acute hospital setting; discharge of frail older (>65) patients ; rapid discharge (<72 hours)		There were only 5 trials of sufficient quality to include. There was no clear evidence of benefit for Complete Geriatric Assessment (CGAs) interventions for mortality [RR 0.92 (95% CI 0.55–1.52)], readmissions [RR 0.95 (95% CI 0.83–1.08)] or for subsequent institutionalisation, functional ability, quality-of-life or cognition. Study quality was poor and more research is recommended.
Graf, 2011 ²²⁵	Systematic review (Medline).	Emergency Department; Geriatric	To review the literature on the use and value of CGA in ED for evaluation of older patients and its influence on adverse outcomes	Eight controlled or matched studies using Complete Geriatric Assessments (CGAs) efficiency and 14 on screening tools. Use of CGA in ED decreases functional decline, ED readmission and potentially nursing home admission in high risk patients. Validated screening tools can be applied to detect high-risk patients who will benefit most from CGA. There is no evidence that undertaking CGA in ED had any effect on mortality. It is more efficient than age based screening and if it is followed by appropriate interventions will lead to improvements in patient outcomes.

Summary of findings

Reviews of the evidence associated with managing ED flow

The interventions included in this theme were most commonly concerned with early patient management processes such as triage, initiatives to manage flow within the department such as assessment/observation units and short stay wards and initiatives to reduce ED attendances. The most commonly reported outcome measures were reductions in length of ED stay; the proportion of patients leaving without being seen and ED waiting time. Harding, et al.²¹⁰ found reductions in all three when they examined triage with management options against triage with prioritisation only. Katz, et al.²¹³ found that interventions that developed post-ED plans were generally effective in improving follow-up rates or reducing repeat visits to ED. Porter²¹⁶ found the same effect when examining rapid assessment models. Triage liaison physicians were reported to have had an impact in reducing ED lengths of stay, compared to nurse-led triage²¹⁹ and senior doctor triage could reduce both waiting times and length of stay in the ED.²⁰⁴

Three reviews assessed the evidence on use of observation or assessment units and short stay wards. One concluded that assessment or observation units had potential to produce benefits including facilitating early senior clinician involvement and reducing length of stay and inappropriate admissions but that this may only apply to specific diagnostic groups.²⁰⁶ This review did highlight that these process benefits reduced workload which in itself could then impact on better decision making. Similarly a review of short stay wards for chest pain and asthma patients found potential to reduce length of stay and produce cost savings but the number of included studies was small and results not consistent.²⁰⁷ Another review focussed on rapid assessment zone/pod initiatives to reduce emergency department overcrowding and found that although the results appeared to suggest a positive effect, the available evidence to support its implementation was limited and weak.²⁰⁵ A much broader review by Hoot²¹² identified a number of solutions that may potentially mitigate ED crowding including use of observation units, increasing staff, referring low acuity patients out and using queueing theory to manage processes.

Flores-Mateo²⁰⁸ found that interventions that aim to increase access to primary care and ED cost-sharing are effective in reducing ED use. Both this review and that by Leydon²¹⁸ reported that patient education programmes did not have a significant impact on patients with primary care conditions using ED.

A review assessing the evidence on using lean processes within ED found that although there was some indication that they may reduce waiting time, length of ED stay and the proportion of patients leaving without being seen the evidence was weak and no studies had examined impact on quality of care or patient outcomes.²¹¹

Workforce

We have included a small number of systematic reviews that have focussed on assessing the evidence on different professional roles in the ED and particularly changing or expanding roles. A systematic review by Carter and Chochinov²²¹ examined the potential impact of Nurse Practitioners (NPs) and found NPs could function as competently as doctors and consistently high rates of patient satisfaction were reported. They concluded that supplementing existing ED staff with NPs can help to manage demand more effectively, especially in high volume EDs and may also have an important role to play in treating lower acuity patients in minor injury units. Another review of management of minor injuries by emergency nurse practitioners came to broadly the same conclusion that this was a safe and effective way of managing this patient group.²²²

The evidence on the effectiveness of physician assistants was less clear. While they were found to be more reliable in assessing particular medical complaints, were more trusted with performing procedures and were approved of by ED staff and patients, there is limited evidence as to whether they can improve patient flow or are a cost-effective response.²²³ The physician assistant role is well embedded in the US health system but not in the NHS so may be of limited relevance. Workforce issues were raised in several other reviews. The review of evidence on use of Lean methods in ED considered impact on employees and found that Lean thinking may have encouraged frontline staff to take control of their own work and contribute to creating an environment committed to continuous improvement. The increasing ability of staff to take control of their own work was also one of the key findings in the review of rapid assessment models.²¹⁶ In addition, the authors also found that rapid assessment models encouraged team working, collective responsibility and helped to improve communication but also had potential for negative consequences creating longer shifts and more demanding working conditions.

Managing the frail elderly in ED

We identified just two systematic reviews that had appraised the evidence on specific management of the frail elderly patient in the ED and both focussed on Comprehensive

Geriatric Assessment (CGA), which is a multi-dimensional and usually inter-disciplinary

diagnostic process to assess a frail older person's condition. Neither study provided conclusive evidence as to the effectiveness of CGA. Conroy, et al.²²⁴ did not find clear evidence for the benefit of CGA on mortality, readmissions, institutionalisation, functional ability, quality of life or cognition. They were also unable to identify any models of care which realise the benefits of CGA in acute, short-term in-patient care. Nor were they able to find any evaluations for interventions for frail older people who are discharged from Acute Medical Units (AMUs), which are increasingly used in the UK.

Graf, et al.²²⁵ suggested that CGA can have a significant impact across many domains. These include: reducing functional decline and ED readmission. Some of their studies showed that CGA did not have a significant impact on outcomes nor mortality, while others suggested that such an intervention could reduce functional decline. There was mixed evidence over institutionalisation. Applying CGA in the ED was viewed to be time-consuming, with the authors presenting the case for shorter and more routinely applicable alternatives.

The literature around CGA suffers from being limited in nature and of variable quality. Some areas, such as adverse outcomes, are under-researched and very little outcomes data was available, while the small number of studies examined made it difficult to draw meaningful conclusions.

Quality

Quality issues were generally the same as those already discussed in the earlier section on GP services in ED. Overall quality of the available evidence is generally poor with a paucity of randomised controlled trials. Only one of the 22 systematic reviews we have included only utilised RCTs in the review²²⁴ another included 14 RCTs in a review of post discharge interventions but there was a broad range of interventions and settings so general conclusions were difficult to form.²¹² Variable metrics used to assess performance precluded meta-analysis in most of these reviews. As previously, there was a high reliance on before and after studies and the authors of the reviews included here identified a similar range of limitations as previously discussed such as poor study design, small sample sizes. Very few studies considered the cost consequences and cost effectiveness of interventions and inclusions were dominated by single centre studies with consequent implications for generalisability and none considered whole system effects and the impact this may have on the success or failure of particular interventions. Four of the systematic reviews we have included are now quite old – two published in 1998^{217, 218} and two in 2003.^{206, 207} Delivery of emergency and urgent care

continues to develop and operates in a rapidly changing environment so, although not without some value, at least some of the studies included in these reviews and the inferences drawn from the results may have limited relevance to current service provision.

We have also conducted a simple quality assessment of the 22 systematic reviews included in this section using four basic methodological criteria: adequate search, assessment of risk of bias in included studies, use of an appropriate method to synthesise the studies (e.g. meta-analysis or narrative synthesis) and whether the authors' conclusions reflected the evidence presented. Critical appraisals from the Database of Abstracts of Reviews of Effects (DARE) were used if available. For other reviews, quality was assessed by one researcher using the full text of the review. The results are given in Table 22.

Table 22 Quality assessment of 22 included systematic reviews on ED service delivery

Author, Year,	Adequate search	Risk of bias assessed	Appropriate method of synthesis	Conclusions justified by evidence presented
Reviews on managing ED flow				
El Abdulwahid 2015 ²⁰⁴	Yes	Yes	Yes	Yes
Bullard, M., et al., 2012 ²⁰⁵	Yes	Yes	Yes	Yes
Cooke, M., et al., 2003 ²⁰⁶	Yes	No	Unclear	Unclear
Daly, S., et al., 2003 ²⁰⁷	Yes	Unclear	Yes	Unclear
Flores-Mateo, G., et al., 2012 ²⁰⁸	Yes	Yes	Yes	Yes
Georgiou, A., et al. 2013 ²⁰⁹	Yes	No	Yes	Yes
Harding, K., et al., 2011 ²¹⁰	Yes	Yes	Yes	Unclear
Holden, R., 2011 ²¹¹	Yes	No	Yes	Yes
Hoot, N., and	No	No	Yes	Unclear

Aronsky, D., 2014 212				
Katz, E., 2012 ²¹³	Yes	Yes	Yes	Unclear
Lee, R., et al., 2008 214	Yes	Yes	Unclear	Yes
Paul, 2010 ²¹⁵	Yes	No	Yes	Unclear
Porter, A., et al., 2014 ²¹⁶	Yes	Yes	Yes	Yes
Roberts, E., and Mays, N., 1998 ²¹⁷	Yes	Yes	Yes	Yes
Leydon, 1998 (From Egleston, 1998 ²¹⁸	Yes	No	Yes	Yes
Rowe, B., et al., 2011 ²¹⁹	Yes	Yes	Yes	Yes
Rowe, B., et al., 2011 ²²⁰	Yes	Yes	Yes	Yes
Reviews on ED workforce				
Carter, A., & Chochinov, A., 2007 221	Yes	No	Unclear	Yes
Wilson, A., et al., 2009 ²²²	Yes	Yes	Yes	Unclear
Doan, Q., et al., 2011 ²²³	Yes	Yes	Unclear	Yes
Reviews on management of frail elderly				
Conroy, S., et al., 2011 ²²⁴	Yes	Yes	Yes	Yes
Graf, C., et al., 2011 225	No	No	Unclear	Unclear

Overall, the reviews performed reasonably well against the four criteria. All except two of the reviews had an adequate search (covering at least two databases and/or other sources). Two reviews only searched MEDLINE or PubMed, which means they may not have located all relevant studies.

Risk of bias of included studies was assessed using recognised checklists or scales in 13/22 reviews. In the remainder, risk of bias was either not assessed or no results were reported. In the absence of a risk of bias assessment, it is more difficult to assess the strength of the evidence underlying the review's conclusions.

Seventeen reviews were judged to have used an appropriate method to synthesise the studies. In most cases a narrative approach was used because the included studies were too heterogeneous for meta-analysis. Reviews that provided a narrative discussion of the included studies without any description of methods of synthesis have been classified as 'unclear'. In most reviews (14/22) the evidence presented was judged to support the authors' conclusions. Reviews where the DARE appraisal considered that the author's conclusions were potentially unreliable or should be treated with caution have been scored as unclear.

Conclusions

This rapid review attempting to assess the evidence on different models of delivering ED services has been particularly challenging. The broad focus on a whole service means there are a whole range of potential areas to assess that are of pressing concern including operational processes at different stages as patients progress through an ED and the issues associated with that (front door assessment, flow through the department, exit block); workforce issues (who does what, when, how many) and the associations with the wider emergency care or hospital system that impact on performance. The more focussed review on co location of primary care within ED did identify a relevant and manageable set of existing systematic reviews and primary research studies to allow some synthesis of evidence. Practical constraints meant that for the second part we have only been able to conduct a "review of reviews" but, given the extensive evidence available, we have probably not done this topic area justice and there will be many relevant aspects that we have not considered at all and given the complexity it has been difficult to identify clear and unambiguous evidence

gaps. However, the review has highlighted some areas that are worth further consideration and can guide future research in this area;

- In the process of conducting these rapid reviews we have conducted extensive searches and have created a substantial library of relevant research articles. Given the complexity of the topic area, more focused reviews could be carried out utilising the work already done here with, where necessary targeted focused additional searches. Because of the complexity and because of the rapidly changing environment and pressure on services to implement change there are already policy and guidance documents from a range of sources such as the Royal College of Emergency Medicine setting out interventions that should be implemented²²⁶ many of which may not have a solid evidence base. Before further more focused reviews are carried out it may be prudent to consult with the RCEM and identify which specific topic areas would benefit from a more detailed analysis
- Although management of the frail elderly is seen as a key area for development⁹ there is remarkably little research on interventions to improve care for this population. There is scope to identify more recent primary studies from our existing search library to supplement the two existing systematic reviews as both were published in 2011 and further review this important area
- One clear evidence gap identified from the research we have appraised here is lack of studies that take a broader system approach to identifying, implementing and evaluating interventions to try and improve emergency and urgent care. This has important implications for future service design and planning. Future ED focussed studies could be broadened out to encompass these wider system issues. If this is ignored there is always a risk that some specific interventions may appear to be inefficient or not deliver intended benefits at an individual service level and abandoned when in fact the benefits may be being achieved elsewhere or some external system issue may be inhibiting an intervention from working optimally.

Chapter 7 -Emergency and Urgent care Networks

Introduction

The final element of the NHS England review⁶ is focused on the development of broad emergency and urgent care networks with the aim of connecting services together as a system. The vision for these networks is that they will reduce boundaries between hospital and community based services and support information flow and expertise across sectors so patient care can be delivered in the most appropriate and convenient setting. The review initially envisaged major emergency centres would take the lead in this development but subsequently NHS England have outlined a wider model based on a combination of strategic and operational functions with no specification on lead

<https://www.england.nhs.uk/2014/05/30/jonathan-benger-2/>

The emphasis on providing emergency and urgent care has seen a shift and consensus that a whole system approach is needed and emergency and urgent care networks are seen as being central to the achievement of system wide objectives. In this review we have attempted to identify if there is any empirical evidence on the organisation, function and effectiveness of emergency and urgent care networks in improving the delivery of emergency and urgent care.

Methods

The methods and search strategy have been described in detail in chapter 2. Searches were conducted for the years 1995-2014. For this review the specific inclusion and exclusion criteria were:

Inclusion criteria

- Focused on whole system emergency and urgent care
- Network operating models used in practice
- Empirical assessment of network performance or effectiveness

Exclusion criteria

- Descriptive studies with no assessment of effect

The results of the searches are given in Figure 7.

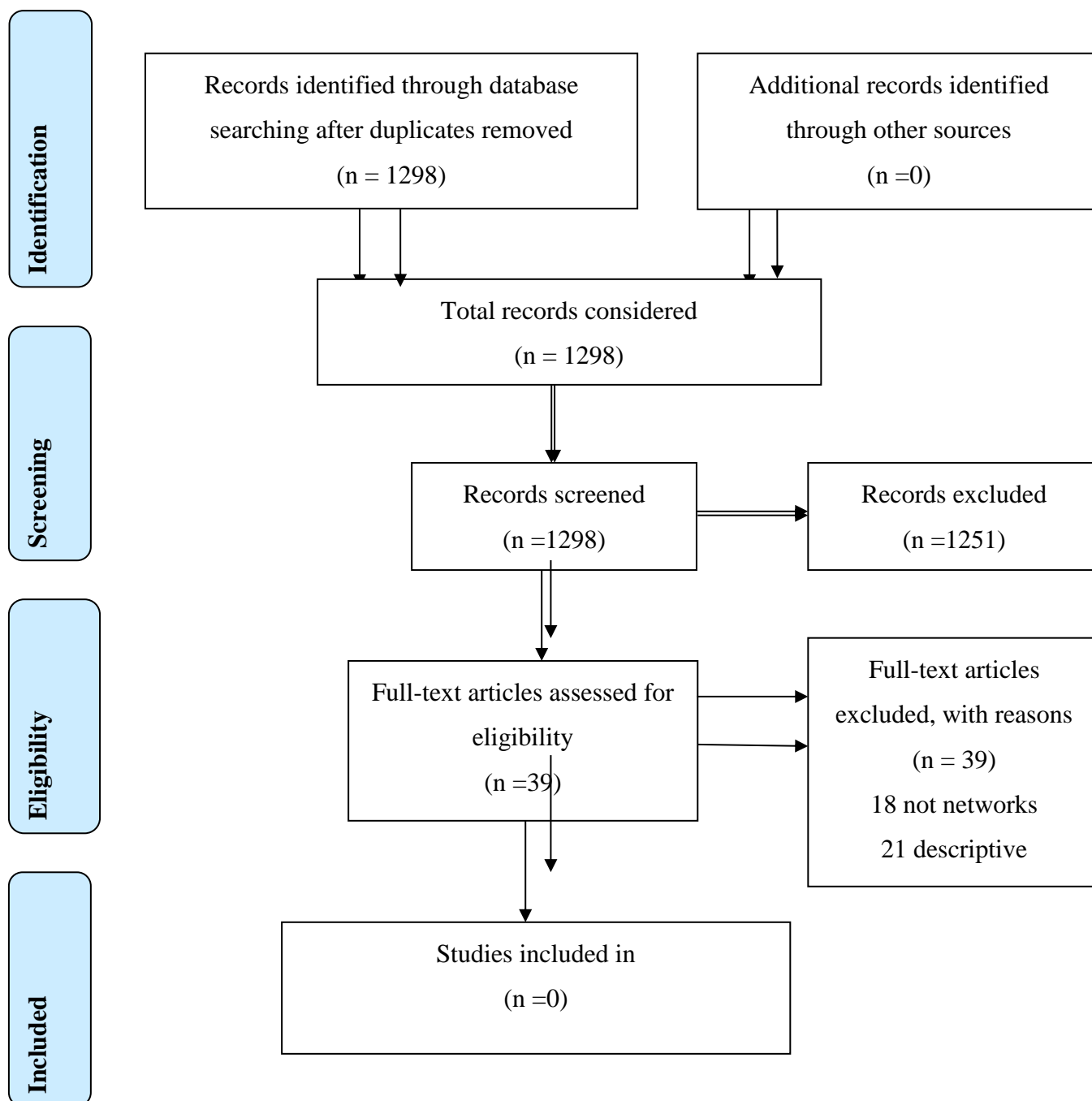


Figure 7 PRISMA flow diagram for emergency and urgent care networks searches

Results

We found no relevant papers that fulfilled the inclusion criteria, that is, provided a description of an operating emergency and urgent care network model with some empirical evidence of how it performed and produced impact on healthcare delivery. There were 21 papers that were related to networks and the delivery of healthcare but these were predominantly related to

- a) Descriptive studies of clinical networks for specific conditions or patient groups but with no assessment of effect. For example, a clinical network to provide care pathways for aboriginal and Torres Straights populations with acute coronary syndromes²²⁷, a model of a Trauma Network in the USA²²⁸ and, perhaps more relevant, a network for integrating ambulance services and acute hospitals in the Netherlands.²²⁹ The description for this network included a statement that Government policy had been put in place to monitor development but no outputs have been identified.
- b) Studies reporting data on activity within clinical networks for specific conditions such as stroke^{230, 231}, trauma^{232, 233} and primary or community care^{234,235} and ST elevation myocardial infarction.²³⁶ Most of these studies claimed clinical networks had improved care by, for example increasing numbers of patients admitted to specialist facilities^{232,230}, receiving thrombolysis for stroke²³¹ and improving mortality from trauma²³³ but all of them reported current activity and had not made any assessment of differences in care compared to before the network became operational and therefore if the network had improved care.

Perhaps more useful in terms of providing insights in to factors that aid or inhibit network function and so provide lessons for emergency and urgent care network development are the small number of qualitative studies that have examined this area in more detail. One study of healthcare professional's perceptions about functioning of a gerontological network highlighted 3 key characteristics – the central role of GPs in co-ordinating care; geriatrician's intervention in assessment of older patients needs and the interface between hospitals, GPs and homecare. Lack of collaboration hindered network function.²³⁷ A UK study of the network governance lessons from a programme aimed at improving care for older people and reducing emergency bed days identified some helpful lessons.²³⁸ The study found features associated with effective network governance included selection of a small number of evidence based services; co-ordination by a network based strategic group with clear

responsibility for implementation at operational level and a “joined at the top” implementation group.

There were a small number of papers that did have an emergency and urgent care network focus but were of limited value in terms of providing evidence on successful and effective network models. One UK paper describes attempts to develop an early emergency care system in Surrey²³⁹ although this is now old, the NHS environment has changed substantially since then and there appears to be no subsequent outputs demonstrating success or further development. Two papers emerged from a US consensus conference on integrated networks of emergency care. One sets out a conceptual framework for how to categorise, designate and regionalize services within a network and identifies a range of research opportunities needed to support this process including contributing to design, processes, utility and impact on patient outcomes.²⁴¹ The other sets out a research strategy for developing methods for defining and measuring success in emergency care networks and the infrastructure need to support it including identifying key metrics, scaling, network data systems and data linkage.²⁴² These two papers set out an “aspirational” view of future emergency care networks and there may be some value in considering the conceptual approaches they have described when thinking about network development but they do not provide any information on how these aspirations might be operationalised in to a functioning network.

Conclusions

We have found no evidence base on how to best organise and operate an emergency and urgent care network with associated empirical evidence to demonstrate the effectiveness of a network model in managing and improving delivery of care. There is some related evidence from other types of clinical networks but these are very focused in their remit. Whilst they may provide some useful insight for network development, strategies that work in improving care for specific conditions or groups of patients with clear and well developed care pathways may not be transferable to the complex, broad population, whole system based focus of emergency and urgent care networks. Literature on networks within the specific topic area of emergency and urgent care is scant and confined to descriptive articles or “think pieces” about the conceptual and aspirational frameworks for network based models rather than examples of functioning network models. We conducted some descriptive research on this topic for the Department of Health in 2007 which described a small number of embryonic

emergency and urgent care networks in existence at the time²⁴³ but which subsequently disbanded or changed with multiple re-organisations. This report did suggest some principles for network development based on the experiences of the early study sites which have been translated in to the NHS England suggested model but we did not measure network effectiveness.

Given that emergency and urgent care networks are a key component of the delivery of the NHS England review there is remarkably little evidence and information available to inform this development. Anecdotally, health economies are building networks but there is no information available at a national level about the structure and operating models of existing networks or indeed how many there are. It is likely that networks are developing in isolation which limits opportunities for sharing experiences about network model design, development and implementation.

There are some key and pressing research activities which could support emergency and urgent care network development;

- A more detailed and targeted rapid review could be undertaken to further explore the more theoretical literature about network model development and implementation to supplement the small descriptive evidence we have identified. More detailed synthesis could provide evidence around central components and strategies for successful network development that could be used to underpin network development now taking place.
- Of course, it may be the case that this additional evidence review is too late and nationally network development is already underway although there may still be some value to modifying existing models. There is a paucity of information about activity in an area of viewed as being of such strategic importance to delivering a whole systems approach to emergency and urgent care. Some rapid scoping research to identify and map current emergency and urgent network development nationally could provide useful information of numbers, size, models, state of maturity etc. This could be supplemented by more qualitative work to identify the more detailed issues associated with developing and implementing a network model including challenges, barriers and facilitators which can then be shared
- A programme of research to evaluate emergency and urgent care progress using case study sites identified from the work suggested above. This would need to be a long-term strategy involving comparing different models of networks to assess processes,

operation and management and ultimately to measure effectiveness and the extent to which different models change and improve the delivery urgent care and achieve the objectives set out in the NHS England review plan.

- Information will be a central component of network function. The earlier chapter on demand set out the importance of whole system information systems which will allow better understanding of demand and inform planning of services needed to meet that demand. Subsequent chapters have highlighted the need to evaluate service developments in terms of whole system as well as individual service impact. Development of robust and linked patient based data systems will be needed to support these activities. Research to better understand the information needs of emergency and urgent care systems and networks and map this to existing information system development by other parts of the NHS , for example the Academic Health Science Networks, Health & Social Care Information Service, NHS England, and local initiatives could inform the development of a coherent national plan for network information system development.

Chapter 8 –Discussion and Conclusions

Summary of main findings

We have conducted five separate rapid reviews spanning a range of themes relevant to the NHS England review of emergency and urgent⁶.

A comprehensive discussion and conclusions are provided at the end of each review chapter. The main findings from each review are briefly summarised here.

Demand for emergency and urgent care

Despite serious concerns about rising demand and the impact this has on health services there is remarkably little empirical evidence that can fully explain why this has occurred. Much of the evidence has focused on either individual services or populations such as the elderly.

Although there is a substantial evidence base that has explored patient reasons for accessing urgent care there is a lack of any sophisticated understanding about what is driving demand for individual emergency and urgent care services and no published literature on whole system demand. In the UK the only recent evidence about whole system demand is that available in the evaluation examining the impact of NHS 111 pilot sites¹⁰⁶ and within this a lack of any data on in hours GP urgent care means the whole picture remains unclear. There is a broad literature of discrete studies on individual factors that may influence demand. The evidence key gaps and challenges identified from the existing evidence relate to:

- A need to examine demand from a whole system perspective and gain better understanding of the relative proportions of demand for different parts of the system and the characteristics of patients within each sector.
- Development of research studies that build on the existing knowledge about factors which may be influencing demand and the contribution each one makes and map these in to a coherent system model. This would then support the development of service design and planning to meet current and future needs of local populations.

Telephone triage and advice

There is an existing, substantial evidence base about the operational and clinical effectiveness of telephone based triage and advice services for management of requests for urgent

healthcare. Overall, these services provide accurate, appropriate and safe decision making, patient compliance with advice is generally high as is patient satisfaction. Where calls have been judged to have been inaccurately or inappropriately triaged the tendency is to assign calls to a higher level of care than needed rather than a lower level so while services appear to be safe they may not be efficient. Evidence gaps and aspects of service delivery that warrant further study include;

- Further assessment of the whole system impact of telephone access services for emergency and urgent care, including the associated costs, to establish how it contributes improving system efficiency.
- More focused research on the broad area of the optimum requirements for different skill levels needed in the NHS 111 service which provides a unique mix of non-clinical, clinical and senior/specialist clinical professionals
- More detailed evaluation of the accuracy and appropriateness of call assessment decisions would help answer some of the questions about the appropriateness of referrals made by the NHS 111 service and identify where there is scope to improve it either through changing the staffing profile, modifying the clinical assessment system or developing better referral pathways.

Management of patients with urgent care needs by the ambulance service in community settings

Extended paramedic roles have been implemented in various health systems and settings and, based on a small number of high quality studies, appear to be successful at reducing transports to hospital, making safe decisions about the need for transport, delivering acceptable care out of hospital and are potentially cost-effective. The key evidence gaps and areas for further research we have identified include;

- Further work on the development of methods to support paramedic decision-making in the community together with development and assessment of out of hospital care pathways for a range of conditions that mediate safe management in the community.
- More detailed study on the necessary skill-mix of the paramedic workforce, optimum proportions of paramedics and paramedics with advanced and specialist skills needed to provide a safe and high quality community based service for patients and the

educational and training needs to support this enhanced role at scale. The potential impact of increasing paramedic prescribing rights will also need to be considered.

- More accurate estimations of the likely proportion of patients who could be safely managed outside hospital to support paramedic workforce planning.
- Further evaluation of the impact of initiatives to develop paramedic practice and increase the number of patients managed in the community is needed to assess the impact of these initiatives at scale, at a whole system level and the cost consequences.

Models of service delivery in the Emergency Department

Attempting to assess the evidence on different models of delivering ED services has been particularly challenging as there is a substantial range of potential areas to assess. The more focussed review on co location of primary care and ED identified potential for this initiative. Practical constraints meant that for the second part we have only been able to conduct a “review of reviews” and given the extensive evidence available and complexity of the subject area it has been difficult to identify clear and unambiguous evidence gaps. The review has highlighted some areas worth further consideration;

- More focused reviews could be carried out utilising the work already done here with, where necessary, targeted and focused additional searches. Because of the complexity and the rapidly changing environment some consultation with the Royal College of Emergency Medicine would help to identify which specific topic areas would benefit from a more detailed analysis.
- Management of the frail elderly is considered a key area for development but there is little evidence on interventions to improve care for this population. There is scope to identify more recent primary studies from our existing search library to supplement the analysis of 2 related systematic reviews.
- One clear evidence gap is the lack of studies conducted at scale and that have considered wider system effects and impact. Given the emphasis on developing co-located primary care services within ED this is one area where there is a clear opportunity to begin to undertake these broader studies.

Emergency and Urgent Care Networks

We have found no evidence base on how to best organise and operate an emergency and urgent care network or any empirical evidence on effectiveness of a network model in managing and improving delivery of care. There is some related evidence from other types of clinical networks but these are very focused in their remit. Whilst they may provide some useful insight for network development, strategies that work in improving care for specific conditions may not be transferable to the complex, broad population, multiple service based focus of emergency and urgent care networks. Literature on networks within the specific topic area of emergency and urgent care is scant and confined to descriptive articles. Given that emergency and urgent care networks are a key component of the delivery of the NHS England review there is a significant evidence gap and hence some key and pressing research activities which could support emergency and urgent care network development;

- A more detailed and targeted rapid review could be undertaken to further explore the more theoretical literature about network model development and provide evidence around central components and strategies for successful network development.
- Network development is already underway so some rapid scoping research to identify and map current emergency and urgent network development nationally could provide useful information of numbers, size, models, state of maturity and issues associated with developing and implementing a network model.
- A programme of research to evaluate emergency and urgent care network progress using case study sites to compare different models of networks and assess processes, operation and management. In the longer term, studies are needed to measure effectiveness and the extent to which different models change and improve the delivery urgent care and achieve intended objectives.

Evidence sources

For some themes a substantial proportion of the existing evidence came from the UK. In particular 85% of the included studies on expanded roles for paramedics were conducted in the UK, and 37% of the studies on telephone triage. A relatively small proportion of studies on providing primary care in ED (17%) were conducted in the UK. No studies on trends in demand came from the UK but almost half (48%) of the studies examining patient reasons for accessing urgent care came from the UK.

Common themes across subject areas

We have conducted five separate reviews focused on specific areas of service delivery and the synthesis of evidence for each individual review revealed a number of common themes that spanned one or more topic areas. This fits with the view that delivery of emergency and urgent care needs to be viewed from a whole system perspective and highlights the clear interdependencies between the different system components that contribute to efficiency and effectiveness.

Although the theme on understanding demand for urgent and emergency care is not a key theme in the NHS England review, we included it in this rapid review to provide context on the underlying issues that are contributing to pressure in the emergency and urgent care system and hence the need for service change. The issues and evidence gaps identified from the analysis of evidence on trends in, and characteristics of, demand were relevant to several subject areas. The most highly relevant was emergency and urgent care networks. The envisaged primary function of a network is to design and plan an emergency and urgent care system that can meet the needs of a heterogeneous and changing population with a range of complex health problems ranging from acute, life-threatening to minor and chronic illness and injury. To do this a detailed understanding of the profile of the population accessing care, the different types of care they will need and the relative proportion of people requiring different types of service within the system is needed. The identified need to develop more sophisticated models that map demand and the needs of local populations, and can begin to estimate how this will change as population characteristics change, has direct relevance to the potential successful functioning of an emergency and urgent care network.

At an individual service level this also has implications for the success of the expected changes in delivery of care. For example, clear estimates and thresholds for the likely proportion of patients who could be safely managed in the community by the ambulance service would inform ambulance service resource and workforce planning. Similarly, initiatives in the Emergency department to better manage specific patient groups, needs information on the likely volumes of patients who, for example, will be suitable for GP care in a co-located primary care unit or specialist major trauma or frail elderly care service.

System designed and developed care and referral pathways – The need for system wide, integrated care and referral pathways was highlighted in the telephone triage and advice and

management of patients in the community by ambulance clinicians themes. In both cases this was seen as critical to further development of these services if they are to operate efficiently and fulfil their potential. The development of these pathways and testing their effectiveness links to the functioning of networks.

Whole service and system impact – a common theme across all three service delivery related reviews was the lack of evidence about the impact of initiatives and interventions at scale. The available evidence is based almost exclusively on evaluations of single initiatives in single centres. This means that, for example, the impact of NHS 111 on delivering system benefits by directing people to appropriate care nationally or at single services level, now that services are much bigger than the pilot services, is unknown. Likewise, although there is good evidence that paramedics can safely manage people in the community, the implications for scaling up interventions for ambulance services and associated primary and community care services, particularly as the desired proportion of patients managed in this way increases, and the impact on, for example ED crowding, is unknown. The impact of scaling up initiatives on both individual and whole system activity, effectiveness and costs is a clear research gap. A final and related theme is that future evaluations of initiatives should be of sufficient length to allow the intervention to mature and function as intended. The risk of not doing this, and of only evaluating the impact on the “host” service rather than the system, is that promising and potentially effective interventions are abandoned, not through lack of evidence but lack of the right sort of evidence.^{106, 200} Well functioning networks with robust information systems will be essential to enabling measurement of whole system impacts and costs.

Limitations

The scope of this rapid review and volume of evidence included means we have not been able to conduct a detailed analysis of the quality of the evidence base but we have provided a broad assessment and commentary of relevant issues in each of the separate review chapters. We have included a substantial number of systematic reviews within the review and have drawn on the findings of these studies to identify significant methodological issues. In addition to the limitations around lack of scale and measurement of system impact already discussed some key themes have been identified that are common across the reviews;

- Overall, the evidence base on effectiveness of different models of care for delivering emergency and urgent care is weak. Only a small number of interventions have been evaluated using randomised controlled trial designs. It is acknowledged however that this is a difficult environment in which to conduct this type of study.
- There is a high reliance on uncontrolled before and after studies within the overall evidence base with consequent serious limitations on interpretation of findings. The majority of studies were single site and small in scale with small sample sizes. This makes generalisability difficult, particularly in terms of the relevance to different health systems. There is a lack of population based studies to inform development of emergency and urgent care systems and services.
- The majority of studies have measured processes such as times, attendance or contact rates, re-admission and re-contact rates to assess effectiveness. With a few exceptions, patient outcome measures have been confined to patient satisfaction and there has been little consideration of important patient outcome measures concerned with safety such as adverse events. The reviews on telephone triage and management of patients by paramedics in the community did identify studies that included patient safety.
- Little attention has been paid to the costs and cost effectiveness associated with interventions.

There are some limitations to the rapid review method we have used. Firstly, we have not been able to exhaustively search for and synthesis all the relevant literature for each of the five themes. We have drawn extensively on existing systematic reviews and only extracted detailed information on primary studies not included in these reviews. This has allowed us to provide a comprehensive overview of the existing evidence base for each theme. However, this was a particular limitation for the review of models of care for delivering ED services. For this theme we only included systematic reviews and therefore have not been able to confidently identify the related evidence gaps. This theme warrants additional, more focussed reviews.

Secondly, emergency and urgent care encompasses a broad patient population, range of services and related factors. Given the potential scope and scale we have used a framework to guide the reviews based in the key policy objectives for emergency and urgent care set out in the related NHS England review⁶ in order to provide focus and relevance. This framework also guided the systematic search strategies tailored to each individual review but given the

scope we have further restricted the focus of two themes (helping people get the right advice and managing more urgent care outside hospital) to the specific areas of telephone based triage and advice and management of patients by paramedics in the community respectively. This does mean that the broader literature on community based urgent care services has not been addressed.

Thirdly, although using the framework provided structure that enabled us to synthesis a large body of evidence in a short timeframe, it does mean there are related themes and subject areas that have been excluded from this review. The most obvious gap is a separate review of models of urgent care within primary care. There is significant overlap within the existing reviews, for example telephone triage, management of patients by paramedics within the community setting and provision of primary care services within the emergency department. However, there may be more specific evidence we have not considered. There is scope to conduct an additional review within this area utilising the search libraries we have generated for this review. We have also not considered the specific but important issues related to the emergency and urgent care workforce such as education, training, skills, recruitment and retention. This may also warrant an additional review although it would be large in scope as there is a wide range of professional groups to consider.

Finally, the short time frame and volume of included material meant we were not able to include any PPI input in to this review. However, this perspective will be important when considering future research commissioning. We have identified a substantial number of evidence gaps which will need to be prioritised and PPI assessment of those gaps and questions will be of value in understanding which ones are most important to patients and the public and which need most urgently addressing.

Conclusions

We have conducted five separate rapid evidence reviews on themes related to the delivery of emergency and urgent care in the NHS. These themes were trends in and characteristics of demand; telephone triage and advice; management of patients in the community by ambulance clinicians; models of service delivery in the Emergency Department and Emergency and urgent care networks.

We have found there is a paucity of evidence to explain the complex reasons that have driven the increases in demand for emergency and urgent care and the detailed characteristics and consequent service needs of the population. There exists a considerable evidence base on the effectiveness of some interventions to improve service delivery but the evidence base overall is weak and based in small single site studies with no assessment of impact at scale or on the wider emergency and urgent care system. A small number of interventions have been robustly evaluated. The delivery of emergency department care is complex and multi-dimensional and it was beyond the scope of this review to identify clear evidence gaps. Further more focused evidence reviews are needed in this area. There is no evidence to support the development of emergency and urgent care networks.

We have identified a number of evidence gaps across the reviews. The gaps that appear to be in most immediate need of addressing are;

- Research to characterise and map demand at a population level and link this to service need so that emergency and urgent care systems can be designed that can effectively, efficiently and safely respond to patient needs.
- An assessment of the current state of play in the development of emergency and urgent care networks and longer term evaluation of the effectiveness of different network models to identify how best networks can deliver NHS England objectives.
- Expanding the current evidence base on existing interventions that are viewed as central to delivery of the NHS England plan, such as increasing the number of patients managed by paramedics in the community, by developing integrated care pathways and assessing the implications of increasing the intervention at scale. Measurement of the costs and system impact will be critical to the assessment of effectiveness and resource requirements needed to support expansion.

Although not an evidence gap, a clear theme that emerged across the reviews was the need for robust, high quality and linked patient data to support service planning and measure whole system benefits and costs and support research. This may need to be addressed alongside any newly commissioned research studies.

There is also a need to plan and design better quality research studies. Some of the problems associated with existing research studies have been highlighted above. Future research will need to address these problems. The broad range of questions evident from the research gaps means a range of designs will be needed to adequately answer these questions. It is not possible to be prescriptive as each question will need a different approach but there is a clear need to move away from uncontrolled studies and better use of quasi-experimental observational studies that do allow comparison against current practice. Evidence gaps concerned with scaling up interventions would benefit from mixed methods approaches that can consider a range of associated issues. Clinical effectiveness may have been demonstrated but translating this in to common practice needs consideration of both the population (quantitative) effects across multiple sites or whole systems and, as importantly, the “real world” processes that effect change and mediate successful adoption of new ways of delivering services. Valuable knowledge can be gained from more qualitative studies that can identify the factors and processes that contribute to success or failure of service change. This is linked to the clear lack of consideration of workforce implications evident in the existing evidence. Future studies, particularly those concerned with scaling up, cannot ignore this component and specific studies providing a primary assessment of assessment of workforce and skill mix requirements may need to be a precursor to any large scale expansion of interventions. Existing studies have also been limited by only measuring short term process and outcome changes and future studies could make better use of, for example, interrupted times series designs to provide a more robust assessment of the impact of service changes in the longer term. Robust economic evaluations should also be conducted alongside any changes to assess cost-effectiveness and also the broader cost shifting that occurs around an emergency care system when large scale service delivery changes are implemented.

There are significant problems within the emergency and urgent care system in the NHS. As a consequence there is pressure to instigate change and services are operating in a rapidly changing environment. Specific programmes such as the NHS England review delivery plan⁸ refer to a number of existing pilot schemes and interventions under development. There are also broader programmes across the NHS that may also have an impact on emergency and

urgent care such as the move to 7 day working, the Prime Ministers Challenge Fund to improve access to primary care <http://www.england.nhs.uk/ourwork/qual-clin-lead/calltoaction/pm-ext-access/>, Vanguard sites for new models of care deliver <http://www.england.nhs.uk/ourwork/futurenhs/5yfv-ch3/new-care-models/> and local initiatives. These programmes mean that there are already potentially large numbers of relevant initiatives already underway or in development but it is difficult to identify the range and scope of existing projects. Before new research to address evidence gaps is commissioned it may be worth considering commissioning a preliminary project to identify and map existing plans and initiatives to distinguish if any evaluation research is already underway, whether the planned evaluation is robust and whether there are potentially suitable initiatives that are at development stage but have no evaluation plan in place. This could reduce duplication of effort and help ensure new model of care are rigorously assessed before they are adopted on a large scale.

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Mr Daniel Bradbury (Medical Student) undertook data extraction in to summary tables for the review on demand for urgent care.

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Ms Janette Turner (Senior Research Fellow) undertook reference sifting and evidence synthesis for the review on demand for urgent care; undertook reference sifting, data extraction in to summary tables and evidence synthesis for the review on emergency and urgent care networks; contributed to report writing including the discussion and conclusions and managed the project.

Data sharing

No new data has been created

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Appendix 1 Search strategies

General Search Strategy

Medline via OVID SP

1. Ambulances/
2. "ambulance*".ab,ti.
3. exp Emergency Medical Services/
4. (pre-hospital or pre hospital or prehospital).ab,ti.
5. Emergency Service, Hospital/
6. "emergency department*".ab,ti.
7. "emergency service*".ab,ti.
8. "accident and emergency".ab,ti.
9. (urgent adj3 care).ab,ti.
10. After-Hours Care/
11. 'out of hours care'.ab,ti.
12. after hours care.ab,ti.
13. 'out of hours medical care'.ab,ti.
14. 'after hours medical care'.ab,ti.
15. 'out of hours service\$.ab,ti.
16. after hours service\$.ab,ti.
17. 'out of hours medical'.ab,ti.
18. 'out of hours clinic\$.ab,ti.
19. after hours medical.ab,ti.
20. after hours clinic\$.ab,ti.
21. or/1-20
22. "Delivery of Health Care"/
23. (classification or economics or legislation jurisprudence or manpower or organization administration or standards or statistics numerical data or supply distribution or trends or utilization).fs.
24. (service adj1 (deliver\$ or reform\$ or reorganis\$ or reorganiz\$ or restructur\$ or chang\$ or innovat\$)).ab,ti.
25. 22 or 23 or 24
26. 21 and 25
27. limit 26 to (english language and yr="1995 -Current")
28. (efficien\$ or effectiv\$).ab,ti.
29. (reduc\$ or shorten\$ or cut\$).ab,ti.
30. (demand or 'waiting time\$').ab,ti.
31. 29 and 30
32. right care.ab,ti.
33. appropriate care.ab,ti.
34. right place.ab,ti.
35. right time.ab,ti.
36. Patient Satisfaction/
37. Patient Readmission/
38. readmi\$.ab,ti.
39. reattend\$.ab,ti.
40. re-attend\$.ab,ti.
41. re-admi\$.ab,ti.

42. revisit.ab,ti.
43. re-visit.ab,ti.
44. Crowding/
45. crowd\$.ab,ti.
46. reduc\$.ab,ti.
47. 44 or 45
48. 46 and 47
49. Health Services Accessibility/
50. 28 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 48 or 49
51. 26 and 50
52. limit 51 to (english language and yr="1995 -Current")
53. Comment/
54. Letter/
55. Editorial/
56. (comment or letter or editorial).pt.
57. 53 or 54 or 55 or 56
58. 52 not 57

Targeted search strategies

Telephone triage search strategy

Medline via OVID SP

- 1 *Telephone/ or *Hotlines/
- 2 (triage or consultation).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
- 3 ("nhs direct" or "nhs 24").mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
- 4 telephone triage.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
- 5 call centre triage.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
- 6 advanced nursing.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
- 7 appropriate*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
- 8 quality framework*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
- 9 under?referral.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]

- 10 inappropriate.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
- 11 safe*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
- 12 danger*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
- 13 satisf*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
- 14 consistency.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
- 15 consequence*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
- 16 (adherence or compliance).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
- 17 decision making.mp. or Decision Making/
18 Decision Support Systems, Clinical/
19 Needs Assessment/
20 Technology Transfer/
21 experience.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
- 22 recommend*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
- 23 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22
- 24 1 and (2 or 3)
- 25 4 or 5 or 24
- 26 23 and 25
- 27 limit 26 to (english language and yr="1995 -Current")

Ambulance search strategy

Medline via OVID SP

- 1 Ambulances/
2 ambulance\$.ab,ti.
3 Emergency Medical Services/
4 (pre-hospital or pre hospital or prehospital).ab,ti.
5 allied health personnel/ or emergency medical technicians/
6 paramedic\$.ab,ti.
7 emergency care assistant\$.ab,ti.
8 emergency medical technician\$.ab,ti.

9 emergency care practitioner\$.ab,ti.
 10 or/1-6,8-9
 11 extend\$ role\$.ab,ti.
 12 extend\$ skill\$.ab,ti.
 13 great\$ role\$.ab,ti.
 14 avoid\$.ab,ti.
 15 alternative care.ab,ti.
 16 (treat\$ or manag\$ or care).ab,ti.
 17 Primary Health Care/
 18 (primary adj3 care).ab,ti.
 19 Community Mental Health Services/ or Community Health Services/
 20 (community adj4 service\$).ab,ti.
 21 (community adj4 care).ab,ti.
 22 intermediate care.ab,ti.
 23 17 or 18 or 19 or 20 or 21 or 22
 24 16 and 23
 25 community management.ab,ti.
 26 pathway\$.ab,ti.
 27 service referral\$.ab,ti.
 28 Staff Development/
 29 (workforce adj3 (develop\$ or skill\$ or competenc\$)).ab,ti.
 30 or/11-15,24-29
 31 10 and 30
 32 (service adj2 (deliver\$ or reform\$ or reorganis\$ or reorganiz\$ or restructur\$ or chang\$ or innovat\$)).ab,ti.
 33 (efficien\$ or effectiv\$).ab,ti.
 34 (reduc\$ or shorten\$ or cut\$).ab,ti.
 35 (demand or 'waiting time\$').ab,ti.
 36 34 and 35
 37 right care.ab,ti.
 38 appropriate care.ab,ti.
 39 right place.ab,ti.
 40 right time.ab,ti.
 41 patient satisfaction.ab,ti.
 42 patient experience\$.ab,ti.
 43 Patient Satisfaction/
 44 patient view\$.ab,ti.
 45 Health Services Accessibility/
 46 safety/ or patient safety/
 47 safe\$.ab,ti.
 48 or/32-33,36-47
 49 31 and 48
 50 limit 49 to yr="1995 -Current"

Emergency department demand search strategy

Medline via OVID SP

1. *Emergency Medical Services/

2. emergency care.ti,ab.
3. urgent care.ti,ab.
4. *Ambulances/
5. ambulance*.ti,ab.
6. (emergency adj2 service*).ti,ab.
7. EMS.ti,ab.
8. *Emergency Service, Hospital/
9. emergency department*.ti,ab.
10. ED.ti,ab.
11. "accident and emergency".ti,ab.
12. A&E.ti,ab.
13. emergency unit*.ti,ab.
14. or/1-13
15. trend*.ti,ab.
16. *"Health Services Needs and Demand"/
17. demand*.ti,ab.
18. Crowding/
19. crowding.ti,ab.
20. or/15-19
21. 14 and 20
22. *Empirical Research/
23. empirical.ti,ab.
24. cause*.ti,ab.
25. *"Aged, 80 and over"/ or *Aged/ or *Population Dynamics/
26. ageing population.ti,ab.
27. reason*.ti,ab.
28. factor*.ti,ab.
29. 22 or 23 or 24 or 25 or 26 or 27 or 28
30. 21 and 29
31. 22 or 23
32. 21 and 31
33. Empirical Research/
34. 23 or 33
35. 21 and 34
36. limit 35 to yr="2003 -Current"
37. from 36 keep 1,3,5,7,9-10,12,14,17,20-21,24,28
38. ((rise or rising or increas*) adj3 (demand* or use* or using or utili* or access*)).ti,ab.
39. 14 and 38
40. "rising demand".ti,ab.
41. 16 or 40
42. 14 and 41
43. 14 and 40
44. ((rise or rising or increas*) adj3 demand*).ti,ab.
45. 14 and 44
46. limit 45 to yr="2003 -Current"
47. from 37 keep 1-13
48. from 46 keep 2,7-8,15,17,19-20,22-29,31-34,36,41-42,48-52,54-58,60-61,64-67,69-70,72-74,76,79-85,87,89,91-92,96,98-100
49. from 46 keep 101-102,104-107,109,111,117,122,125-127,129-130,133,135-138,140-141,143-145,147-151,153,156,159-160,162,168-169,171-177,181,184-185,188-192,194

50. 48 or 49
51. from 50 keep 1-112
52. 25 or 26
53. 14 and 52
54. limit 53 to yr="2003 -Current"
55. 54 not 46
56. from 55 keep 1,3,7-8,12,14,16-19,22,24,27-28,30-34,36-37,39-54,56-57,59-60,64,66-67,70-71,73-75
57. from 56 keep 1-49
58. 18 or 19
59. 14 and 58
60. limit 59 to yr="2003 -Current"
61. 36 or 46 or 54
62. 60 not 61
63. crowding.ti.
64. *Crowding/
65. 63 or 64
66. 14 and 65
67. 66 not 61
68. emergenc*.ti.
69. 63 and 68
70. 69 not 61
71. limit 70 to yr="2003 -Current"
72. limit 69 to (english language and yr="1995 -Current")
73. limit 53 to (english language and yr="1995 -Current")
74. limit 45 to (english language and yr="1995 -Current")
75. limit 35 to (english language and yr="1995 -Current")
76. 72 or 73 or 74 or 75
77. or/15-17
78. 14 and 77
79. 34 and 78
80. limit 79 to (english language and yr="1995 -Current")
81. 73 or 74 or 80

Emergency department re-organisation search strategy

Medline via OVID SP

1. *Emergency Service, Hospital/
2. *Emergency Medical Services/
3. *Emergency Medicine/
4. (emergency adj2 service\$).ab,ti.
5. emergency care.ab,ti.
6. urgent care.ab,ti.
7. emergency department\$.ab,ti.
8. or/1-7
9. *Efficiency, Organizational/
10. patient outcome\$.ab,ti.
11. *"Quality of Health Care"/

12. *Models, Organizational/
13. organi?ation\$.ab,ti.
14. *Cost-Benefit Analysis/
15. cost\$.ab,ti.
16. effectiveness.ab,ti.
17. efficacy.ab,ti.
18. efficiency.ab,ti.
19. utilization.ab,ti.
20. *Health Services Accessibility/
21. (service adj1 (deliver\$ or reform\$ or reorganis\$ or reorganiz\$ or restructur\$ or chang\$ or innovat\$)).ab,ti.
22. or/9-21
23. "out of hours".ab,ti.
24. "walk in centres".ab,ti.
25. "fast track areas".ab,ti.
26. "fast track unit".ab,ti.
27. *Nurse Practitioners/
28. *Nurse Administrators/
29. *Triage/
30. copayment.ab,ti.
31. "cost sharing".ab,ti.
32. "incentive based".ab,ti.
33. "coinsurance".ab,ti.
34. "tiered benefit".ab,ti.
35. "patient charge".ab,ti.
36. gatekeeping.ab,ti.
37. *Gatekeeping/
38. *Primary Health Care/
39. "urgent care centre\$".ab,ti.
40. "patient flow\$".ab,ti.
41. emergency care access point\$.ab,ti.
42. stream\$.ab,ti.
43. or/23-42
44. 8 and 22 and 43
45. Editorial/
46. Letter/
47. Comment/
48. (editorial or comment or letter).ab,ti.
49. or/45-48
50. 44 not 49
51. limit 50 to (english language and yr="1995 -Current")

Warwick review update search

Medline via OVID SP

1. primary care.mp. or exp Primary Health Care/
2. exp Physicians, Family/
3. general practitioner\$.mp.

4. exp After-Hours Care/
5. (out-of-hours or OOH).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
6. 1 or 2 or 3 or 4 or 5
7. exp Emergency Medical Services/ or exp Emergency Service, Hospital/
8. ((accident and emergency department) or emergency department or casualty).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
9. 7 or 8
10. 6 and 9
11. limit 10 to (humans and yr="2009 -Current")

Networks search strategy

Medline via OVID SP

1. Ambulances/
2. "ambulance*".ab,ti.
3. exp Emergency Medical Services/
4. (pre-hospital or pre hospital or prehospital).ab,ti.
5. Emergency Service, Hospital/
6. "emergency department*".ab,ti.
7. "emergency service*".ab,ti.
8. "accident and emergency".ab,ti.
9. (urgent adj3 care).ab,ti.
10. After-Hours Care/
11. 'out of hours care'.ab,ti.
12. after hours care.ab,ti.
13. 'out of hours medical care'.ab,ti.
14. 'after hours medical care'.ab,ti.
15. 'out of hours service\$.ab,ti.
16. after hours service\$.ab,ti.
17. 'out of hours medical'.ab,ti.
18. 'out of hours clinic\$.ab,ti.
19. after hours medical.ab,ti.
20. after hours clinic\$.ab,ti.
21. or/1-20
22. inter-professional collaboration.ab,ti.
23. interagency relation\$.ab,ti.
24. inter-organisational relationship\$.ab,ti.
25. interprofessional relation\$.ab,ti.
26. interinstitutional relation\$.ab,ti.
27. Community Networks/
28. (care adj3 network\$.ab,ti.
29. (clinical adj3 network\$.ab,ti.
30. (hospital adj3 network\$.ab,ti.
31. (health adj3 network\$.ab,ti.
32. (research adj3 network\$.ab,ti.

33. (practice adj3 network\$).ab,ti.
34. (emergency adj3 network\$).ab,ti.
35. (trauma adj3 network\$).ab,ti.
36. or/22-35
37. 21 and 36
38. limit 36 to (english language and yr="1995 -Current")

